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A comparison of the learning styles of community college versus four-year college and male versus female college students

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A COMPARISON OF THE LEARNING STYLES OF COMMUNITY COLLEGE VERSUS FOUR-YEAR COLLEGE AND MALE VERSUS FEMALE COLLEGE STUDENTS

by
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ABSTRACT

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May, 1996
Advisor: Dr. Burness Broussard
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The purpose of this study was to compare the learning styles of community college versus four-year college General Psychology students and male versus female college students from the combined groups, to ascertain if differences in learning style existed between the groups. The study identified David Kolb's Learning Styles Inventory elements that were important to the males/females and community college/four-year college students.

The sample included 16 General Psychology students from Salem Community College, and 29 General Psychology students from Rowan College. There were 27 female and 18 male students who participated from Salem Community College and Rowan College combined.

All subjects completed David Kolb's Learning Styles Inventory in a classroom setting. The proportion of students preferring each learning style was the unit of analysis. A two-tailed *t* test was performed and results indicated that there were no statistically significant differences between the learning styles of community college versus four-year college students, nor between the learning styles of female versus male college students.

MINI-ABSTRACT

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CHAPTER I

THE PROBLEM

Introduction

Since the late 1970s a great deal has been written about differences in students' learning styles. Learning styles are individual preferences for particular learning environments. They have been presented as preferences for where, when, with whom, as well as with what lighting, food, or music one tends to study. Tendencies to learn better from visual as opposed to verbal materials have also been investigated (Woolfolk, 1993). Research regarding learning styles is significant to the educational community because it demonstrates that people learn best in certain situations and in certain environments. It also shows that students learn best in a variety of ways and that a learning environment that is beneficial for one person may not be beneficial for another.

The most effective learning environment would provide situational conditions that allow a student to perform to his or her learning style. Identifying ways in which a student learns best and constructing an environment to suit that style can enhance the student's potential for learning.

Need

There is a need to pursue further research in the area of learning styles because it is a fairly new concept to the field of educational psychology. Researchers are beginning to realize that traditional modes of instruction are not always effective for all

students. In fact, research indicates that there are many ways of learning that include cognitive, affective, and physiological behaviors (Woolfolk, 1993). Research that focuses on the learning styles of particular groups of individuals informs instructors, administrators, and the greater educational community of the particular preferences that these groups have. If the information gained is used properly, than educational programs that best suit students' needs could be developed in order for them to learn most effectively. The overall goal of this research is to gain knowledge and insight into particular areas so that practitioners can develop strategies necessary to improve the field in which they work. Gaining more information about the learning styles of students in certain groups will help educators develop more efficient and productive techniques in order to best serve those students.

This researcher feels that there is a need to examine the learning styles of community college students because this population has not been thoroughly studied by the educational community. Having an awareness of their learning styles is important for two-year college institutions, which place primary emphasis on effective instruction.

Purpose

The purpose of this study was to compare the learning styles of community college students in a General Psychology course versus the learning styles of four-year college students in a General Psychology course, to ascertain if differences in learning style existed between the two groups. It was also the purpose of this study to compare the learning styles of male versus female college students within this same population. The study identified David Kolb's Learning Styles Inventory elements that were

important to the community college/four-year college students, and the male/female college students.

Null Hypotheses

1. There will be no significant difference between the learning styles of community college versus four-year college General Psychology students.

2. There will be no significant difference between the learning styles of male versus female General Psychology college students.

Theory

This study was based on David Kolb's theory of experiential learning and his concept of learning styles. Kolb described the learning process as a four stage cycle through which an individual passes in perceiving and processing information (Matthews & Hamby, 1995). Kolb demonstrated that learning style is characterized by the degree to which the learner emphasizes abstractness over concreteness and action over reflection in the learning situation.

Kolb developed The Learning Styles Inventory to measure differences in this degree of emphasis and to identify specific learning styles. The Learning Styles Inventory produces scores on four basic learning modes: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. These learning modes can be plotted on a grid to produce four basic learning style

types. These four types have been labeled by Kolb as Accommodator, Diverger, Assimilator, and Converger. The four types are described by Kolb as follows:

1. The *Accommodator* emphasizes concrete experience and active experimentation. Their greatest strength lies in getting things done, carrying out new plans and experiments, and being involved in new experiences. This person is task oriented and relies heavily on other people for information rather than on his or her own analytic ability to gather information.

2. The *Diverger* relies on concrete experience and reflective observation. Their greatest strength lies in imaginative ability and in the ability to view concrete situations from many perspectives. This person excels in generating ideas and working with people.

3. The *Assimilator* focuses on abstract conceptualization and reflective observation. Their greatest strength lies in the creation of theoretical models. Ideas and concepts are important to the assimilator and although a theory must be sound and just to the assimilator, it does not have to be practical.

4. The *Converger* emphasizes abstract conceptualization and active experimentation. Their greatest strength lies in the ability to solve problems and make decisions. Convergers do best in situations where there is only one correct answer to a question or problem.

Kolb has defined learning as an experiential process, where knowledge is created through the transformation of experience. His Learning Styles Inventory attempts to identify an individual's preferred style of learning at a particular time. Preferred styles are seen as influenced by factors in the past and present. Factors in the past include previous experiences as well as habits of thought and action, personality orientation and education. Among present factors are career choice, current job or current studies.

Definition

Learning Styles: Preferred ways of studying and learning, such as using pictures instead of text, working with other people versus alone, and learning in structured or in unstructured situations (Woolfolk, 1993).

Assumptions

It was assumed that the students in this study would respond honestly and that their self-perceptions on the Learning Styles Inventory would be accurate.

Limitations

This study was limited to two classrooms; one in a small four-year suburban college, and the second in a small rural community college. Both were located in South Jersey. The sample was selected because it was accessible to the researcher. The

only instrument that was used to assess the learning styles of the students was Kolb's Learning Styles Inventory (LSI).

The interpretation of the results of this study should be confined to the population tested, and inference beyond the findings and conditions of this study should be cautiously drawn.

Overview

In Chapter II, this study introduces the literature concerning Kolb's Learning Style Theory, as well as other learning style theories presented by leading researchers. The study also reviews the literature concerning the learning style differences of various student populations and the subsequent implications for both students and instructors. Finally, literature is reviewed which indicates the results of applied learning style programs within schools nationwide. In Chapter III, this study discusses the methodology utilized, including information pertaining to the sample, instrumentation, and procedures. This researcher presents the data and findings obtained in this study in Chapter IV.

Learning style theories represent a new area of research. No studies were found to reflect the exact same purpose of this study. In the following literature review, relevant studies are presented that have been conducted in the area of learning styles to date.

CHAPTER II

REVIEW OF THE LITERATURE

Experiential Learning Theory

Kolb's Learning Style Theory holds it's roots in the Theory of Experiential Learning. Experiential learning is defined as the knowledge and skills acquired through life, work experience and study which are not formally attested through any educational or professional certification (Evans, 1994). Experiential learning is as valid a way of learning as learning from books, lectures or laboratories. Evans (1994) asserts that experiential learning is important because with its assumption that informally acquired knowledge and skill may be as significant as learning through any formal means, it represents the recognition that individuals can and do learn by doing as well as through formal instruction, and most important, that many learn without being taught at all. This statement is important because it represents the notion that students bring different forms of learning with them to the educational setting, depending on their previous experiences.

Educators have concentrated their interest on experiential learning as a teaching technique. As experienced teachers, they claim that there are many people who learn effectively through doing things, and having learned successfully, are subsequently better able to learn in more abstract ways from books and formal instruction (Evans, 1994). In other words, there are certain individuals who learn most effectively through "hands on" types of activities. They may prefer learning in environments that provide various outlets for the performance of learning activities. These people would prefer flash cards in math class, acting out story lines in English class, and using computer

programs that lead them through historical adventures in history class.

In some instances, those who prefer the more "hands on" approach to learning may be discouraged with the traditional modes of formal education which emphasize learning from books, lecture, and film strips. They may have little confidence in their ability to learn in a formal setting, and may even be reluctant to approach institutions in the formal higher educational system.

The idea of experiential learning as an educational concept is a relatively recent one. Educational theorists have described experiential learning as including: learning through the process of living and included work experience, skills developed through hobbies and interests, and non-formal educational activities (Burnard, 1991). Malcolm Knowles (1980) takes experiential learning through instruction one step further by defining the process in terms of the following list:

> Group discussion, cases, critical incidents, simulations, role-play, skills practice exercises, field projects, action projects, laboratory methods, consultative supervision (coaching), demonstrations, seminars, work conferences, counseling, group therapy and community development.

The list is so all-inclusive that the researcher seems to have been saying that experiential learning techniques exclude only the lecture method or private, individual study and that experiential learning is synonymous with participant and discovery learning (Burnard, 1991).

Steinaker and Bell (1979) offered an experiential taxonomy that was slightly more specific to the learning process and that is described in terms of five levels. At the first level, the learner becomes conscious of an experience. At the second level, called the

participation level, the learner has to decide whether or not to take part in that experience. At the third level, the student becomes immersed in the experience both intellectually and emotionally. At level four, the student begins to absorb the learning that takes place and makes it his or her own. Finally, the learner, having internalized the learning from experience, shares it with others.

Many of the concepts in experiential learning can be traced back to Dewey who stated:

> Thinking includes all of these steps, the sense of a problem, the observation of conditions, the formation of rational elaboration of a suggested conclusion and the active experimental testing (in Burnard, 1991).

It was Carl Rogers however, who offered the clearest and most influential definition of what experiential or "significant" learning might be (in Burnard, 1991). Rogers' view of experiential learning was a view of "personalized" learning, much like the ideas that invade the literature on learning styles today. Experiential learning, for Rogers, was learning that was self-initiated and in which the learner's interest and motivation was high. He states that there are certain "assumptions" relevant to experiential learning which include the following:

1. Human beings have a natural potentiality for learning.
2. Significant learning takes place when the subject matter is perceived by the student as having relevance for his own purposes.
3. Much significant learning is acquired through doing.
4. Learning is facilitated when the student participates responsibly in the learning process.
5. Self-initiated learning, involving the whole person of the learner (feelings as

well as intellect) is the most pervasive and lasting.

6. Creativity in learning is best facilitated when self-criticism and self-evaluation are primary, and evaluation by others is of secondary importance.
7. The most socially useful learning in the modern world is the learning of the process of learning, a continuing openness to experience, and incorporation into oneself of the process of change.

The field of experiential learning is broad and diverse. It encompasses a number of overlapping and yet differing aspects. It has been described as a process of learning by experience, and as a series of particular sorts of activities (Burnard, 1991). Indeed, experiential learning is a very controversial topic and there are many meanings associated with the topic depending on the particular theorist who happens to be writing about it. The researcher narrows the focus of experiential learning to the theorist who developed a theory of learning style preferences based on the broad topic of experiential learning.

Kolb was very explicit about the learning process in his "experiential learning model". In this model, concrete experience was the starting point for a reflective process. This process enables one to change his or her view of the world and ultimately, to change the world itself (Kolb, 1984). Kolb composed the Experiential Learning Cycle which is as follows:

1. Concrete Experience
2. Observations
3. Formation of abstract concepts and generalizations
4. Testing implications of and reflections on concepts in new situations

Kolb may have devised his definition of experiential learning from the work of

Dewey, who also believed that learning started with concrete experience and was a cycle involving action and reflection. Dewey believed that every experience should do something to prepare a person for later experiences of a deeper and more expansive quality. He also placed accent on the primacy of personal experience and on reflection as the tool for changing knowledge and meaning (in Burnard, 1991).

Continual works of Kolb (1984), defined learning as "the process whereby knowledge is created through the transformation of experience". He described the learning process as consisting of two dimensions: grasping information and transforming information. He describes the process as follows:

Each dimension is characterized by two dialectically opposed learning orientations. Grasping information occurs either through concrete experience or through abstract conceptualization. *Concrete experience* focuses on tangible involvement in immediate experience and often involves feelings. *Abstract conceptualization* represents a less personal interpretation of experience related more to thinking than feeling. Transforming information occurs either through reflective observation or through active experimentation. *Reflective observation* represents an internal attempt to understand the world, often by watching, whereas *active experimentation* represents an external attempt to influence the world by active involvement in experience. The combination of possibilities for grasping and transforming information results in distinct learning styles as well as varying levels of integration of learning orientations.

Kolb further described development as beginning with the acquisition of learning capabilities and cognitive structures that become specialized during the adult years. Adults develop preferences for and competence in learning situations that assist them in achieving success in work and personal environments. Once success is achieved,

individuals sometimes find that expression of modes in addition to their specialized one is necessary for personal fulfillment. Expression of orientations in addition to their specialized one enriches the learning experience and results in an integrative stage of development. This has relevance for students who would be expected to develop learning orientations that increase success in their current learning environments. Do some students have their own unique learning style in which no learning environment can change? A review of various research findings in the area of learning styles is presented in order to answer this question.

Research Findings Using Kolb's Learning Style Inventory

Sims, Watson and Buckner (1986) presented an analysis which indicated that Kolb's Learning Styles Inventory was popular in a variety of studies concerning learning styles. The purpose of The Learning Styles Inventory is to measure the degree to which individuals display learning styles derived from Experiential Learning Theory. Recently, Kolb's Experiential Learning Theory and its associated Learning Styles Inventory has received considerable attention. The Learning Styles Inventory, developed to measure individual learning style preferences, was based on the theory that habits of learning emphasize some aspects of the learning process over others. Kolb's analysis indicated that interest and success within certain jobs and disciplinary fields might correlate with type of learning style. Experiential Learning Theory also postulated that learning styles are relatively stable, enduring characteristics of the learner.

Many of the studies which utilized Kolb's Learning Styles Inventory compared

one group's learning style preference versus another group's learning style preference. For example, Trayer (1991) set out to determine the learning style differences of gifted versus regular language students (See Chapter 1 for definitions of the learning styles that will be described).

Using Kolb's Learning Styles Inventory, she found that in Spanish classes, gifted students tended to be accommodators (43%) more than regular students (21%). In French classes however, gifted students tended to be assimilators (53%) more than regular students (27%). The division of the total sample of gifted students' learning styles in this study showed a higher percentage in the learning style category of the assimilator than the regular students. It is interesting to note that assimilators have the characteristics that describe successful students in traditional classrooms. They are industrious, logical, and analytical. It is not surprising that those labeled "gifted" would have a learning style congruent with the traditional classroom approaches to learning. Of course they would respond most appropriately to traditional classroom methods.

Although Trayer found students with different learning styles, she did not suggest matching styles with learning approaches. She stated the following reasons for her suggestion:

1. Students have qualities of all styles from one degree to another.
2. Students need to learn to adapt.
3. Teaching style includes a teacher's personal behaviors and media technologies chosen to deliver and receive information.
4. Too much matching can create boredom.
5. Periods of mismatch however, can produce new and varied experiences, but chronic periods of acute mismatch can result in mental, emotional and physical problems (Trayer, 1991).

What the researcher recommended was that a variety of methodologies be used in the foreign language classroom to accommodate the variety of students present. Trayer suggested that teachers administer a learning styles inventory to find out the makeup of their classes. She believed that with few exceptions, every class would have all styles represented. She contended however, that there may be a dominant style, as was found with the gifted population in her study. This information can help teachers understand not only what concepts and activities will be more successful but also why certain students may be having trouble. Using a lesson plan that includes activities appealing to all of these styles may help ensure higher achievement and better attitudes in the classroom.

Biberman and Buchanan (1986) used Kolb's Learning Styles Inventory in order to determine if their where learning style differences across business and other academic majors. They contended that although learning style differences have been studied in various contexts, little is known about the ways this variable differs among students enrolled in different courses of study. The study examined differences in learning styles of students enrolled in four business school majors including accounting, economics/finance, management, and marketing. It also compared these differences with those of students enrolled in other majors.

The study found that accounting students, similarly to science majors, scored as Convergers. Both management and marketing majors scored as Divergers, to an even greater extent than did the humanities and applied majors (who also scored as divergers). Only the economics/finance majors scored rather weakly, as accommodators (which is the category which Kolb has placed business majors, in the past). The social science majors scored as assimilators. In contrast to the business

majors, students with nonbusiness majors placed in quadrants which were congruent with Kolb's descriptions of each quadrant and representative majors.

In the past, Kolb has placed all business majors in the learning style category of Accommodator. This study however, demonstrated that there was a diversity of learning styles among business majors. The researchers of this study suggested that these learning style differences have always existed, but that Kolb and others did not find them because they lumped all business students together. By doing this, they implicitly assumed that all business students were alike (Biberman & Buchanan, 1986).

Teachers often assume that students of one major are all alike. This study points out that it is important for them to remember that majors have all different learning styles, just as the business majors had all different learning styles depending on their concentration. The researchers advised instructors to give a variety of work assignments and to have several bases for assigning grades, rather than relying on the instructor's favorite assignment or type of examination questions. They also suggested that faculty members use a variety of teaching techniques (such as lecture and discussion, experiential exercises, case discussions, and role playing), rather than relying on his or her preferred teaching technique or style.

A study by Titus, Bergandi and Shryock (1990) investigated adolescent learning styles using Kolb's Learning Styles Inventory. They pointed to the theorist Piaget as an instrumental influence on Kolb. Piaget believed that abstractness increased with age and that therefore adolescents would be more concrete/less abstract than adults. The researchers assumed, as a result of this theory, that in a freshman-senior high school comparison, seniors would be expected to be more abstract in their learning style than freshman and that the sample as a whole, would exhibit less abstract thought than the

adult norms. Another study conducted by Kolb in 1976 found females who scored higher on concrete-experience than males, and males who scored higher on abstract-conceptualization than females. On this basis, they predicted that females would show a bias toward concreteness in their learning style and that males would show a bias toward abstraction in theirs (Titus et al., 1990).

This study found that older adolescents (seniors) described themselves as more abstract than younger adolescents (freshman), but did not describe themselves as more abstract than the adult norms. The researchers suggested that movement toward greater abstraction was being made, but that the highest level was not achieved until sometime in adulthood. They also observed that senior male students came closest to the center of the adult sample and that the "opposite" group, freshman female students were farthest away. Their findings lead them to believe that age and gender were both involved in the maturation of learning style.

The results however, were mixed regarding their agreement with Kolb's (1976) findings on gender. Like Kolb's adult sample, female adolescents described themselves as more concrete than males over all grade levels. Unlike Kolb's sample however, adolescent males did not describe themselves as more abstract in their learning style than did females over all grade levels. Another gender related finding was that the female adolescents were fairly homogeneous in their learning styles (with the female groups clustered together in one learning style quadrant), while males were disparate with respect to age. This demonstrated that significant differences between freshmen and seniors were observed primarily among males, with little difference among the females (Titus et. al., 1990).

The researchers concluded in this study, that a four-year age span can make a

difference in learning style. They noted however, that effects due to age were seen mostly among males. They suggested that it may be advantageous to introduce abstraction into educational material gradually as the student matures,and that direct student activity during instruction would be appreciated more by the younger student. In addition, they stated that more diverse and flexible teaching models would better serve male adolescent learners, whereas a more homogeneous system would be more effective with a female population.

Matthews and Hamby (1995) also used Kolb's Learning Styles Inventory to compare the learning styles of High School and College/University students. In their study they found that high school and college students differ significantly in learning style preferences. Comparisons of all students across Kolb's four learning styles revealed that a greater proportion of high school students preferred the Assimilator and Converger styles than did college students and that a greater proportion of college students preferred the Diverger and Accommodator styles than did high school students.

Matthews and Hamby also completed an analyses of high school and college subgroups, which revealed that sex-by-race interactions gave insight into some powerful learning style differences. They found that race may have been a more powerful factor than sex in relation to the Diverger, Converger, and Accommodator styles. For example, African Americans were more likely than Caucasian Americans to choose the Diverger style in high school, but the opposite was true in college. Caucasian Americans were more likely than African Americans to choose the Converger style in college, but the opposite was true in high school. Both African American college subgroups preferred the Accommodator style more often than their

high school counterparts, but Caucasian American college and high school students did not differ significantly in their choices for the Accommodator style. The only significant difference for the Assimilator style occurred between the African American males; high school students preferred this style more often than did college/university students.

In summary, five trends emerged from the learning style data. African American males and females who went to college were more active in processing information and relied less on human relations than similar high school students. Caucasian American males who elected college had more people-oriented styles than similar high school students. Caucasian American females who went to college had styles that placed more emphasis on creativity and many answers to questions than they did on styles that emphasized one right answer to a problem, when compared with high school students. Abstractness decreased for Caucasian American males and females in the college/university sample when compared with Caucasian American high school males and females. African American males and females who chose to go to college were more analytic, one-answer problem solvers than their counterparts in high school. In regard to development, changes in style from high school to college/university in African American males and females demonstrated more developmental trends than did changes in Caucasian American males and females (Matthews & Hamby, 1995). Overall, the authors of this study concluded that students who elect to go to college may differ in learning styles from students who are in high school, and that administrators and faculty must accommodate the delivery of services to their styles.

Another study which supported the idea that learning styles may be gender specific, used Kolb's Learning Styles Inventory to measure gender differences in learning styles, using a sample of college freshman. Marcia Magolda (1989) cited

theorists studying women who argued that women's cognitive development represents a parallel but qualitatively different pattern of development from that of men. She concluded from previous research that student development educators who provide college environments to maximize development for both genders could do so more effectively with a better knowledge of how men and women differ in their approaches to learning.

Kolb's theory does in fact describe learning and development as social processes. By expressing the numerous individual paths of learning resulting from this social process, this theory allows for differing patterns of development emerging from male and female socialization (Magolda, 1989). Kolb explained differences found on the concrete-abstract dimension as a result of the socialization of men, which tends to be impersonal and logical versus the socialization of women, which tends to be personal and caring (Kolb, 1984). In a sample of 1,439, Kolb found that 59% of the men were oriented toward the abstract and 41% toward the concrete. For women, 59% were oriented toward the concrete and 41% toward the abstract.

Magolda (1989) found in her study that the converger style was preferred by the least number of students (17%) but that no overall differences occurred on the basis of learning style. The percentage of men and women preferring each learning style was nearly equal, with no significant differences in learning style by gender. Analysis of learning *orientations* indicated that more women preferred concrete experience (59%) than abstract conceptualization (41%) but that men were evenly divided on this dimension. However, these differences were not statistically significant. More men (58%) than women (57%) preferred reflective observation than active experimentation but that difference was also not statistically significant.

The learning style data matched Kolb's finding that women prefer concrete experience over abstract conceptualization. The difference however, was not statistically significant. Men did not exhibit the opposite preference in Magolda's study, so general differences on the basis of learning orientation considered alone are slight.

Magolda concluded the study by stating that student development educators have the opportunity to play a significant role in validating the female pattern of listening and collaborating with others and helping all students develop the concrete experience orientation. Programming efforts that incorporate student sharing of experiences, offer new experiences along with the opportunity to discuss the experiences. Supporting both gender patterns in processing experience reinforces the student as a "knower". She also stated that counseling and advising approaches centered on the students' experiences both reinforce gender patterns and validate concrete experience. Acknowledging the role of relationships to others in women's personal and educational decisions would assist personal and career counselors in understanding and validating the perspectives women present. Concrete experience could also be emphasized through student involvement and collaboration in communities such as student organizations or residence halls.

Research Findings Using Diverse Learning Style Inventories

Many researchers have completed studies similar to those previously cited. Henson and Schmeck (1993) completed a study similar to the one investigated by Matthews and Hamby (1995). Instead of examining the learning style differences

between high school and college students however, they looked at the learning style differences of community college versus university students.

The objective of the study by Henson and Schmeck (1993) was to identify differences in learning styles between individuals who choose to attend a community college and those who go directly to a major university. Analysis of variance showed no significant mean differences between community college and university students in relation to learning style. Community college students scored higher on a scale that reflected a high need for approval and a tendency to "look good" (including faking and lying). University students had one-half the score of community college students on that particular scale. The authors of the study discussed the idea that community college students may think that they need to act like good students in order to be good students. They suggested that training programs should take this difference into account when preparing community college students for university study.

Jacobs (1990) also investigated groups of students in relation to learning style differences. Using a learning style inventory created by Dunn, Dunn, and Price (1975), he compared the learning styles of black high, average and low achievers. Dunn, Dunn and Price (1975) defined learning style as follows: the situational conditions that allow a student to perform to his/her potential as defined by the cognitive, affective, and physiological behaviors that are indicative of how a student learns.

According to Dunn, Dunn, and Price (1975), individualizing or personalizing instruction simply focuses the emphasis of the instructional process on each individual student. Examples include: one's skills, abilities, interests, learning styles, motivation, goals, rate of learning, self-discipline, problem solving ability, degree of retention, participation, strengths, weaknesses, and prognosis for moving ahead in various

curriculum areas and projects. In this situation, the teacher becomes more professional and assumes the function of learning facilitator, guide, consultant, professional diagnostician, and prescriber of learning resources. The process places more responsibility for learning on the student and makes better use of his/her individual interests, goals, and strengths (in Weber, 1983).

Jacobs (1990) contended that individuals within any society have different styles or methods of doing things and that style differences can be observed in dress, speech, athletic performance, problem-solving techniques, and mannerisms. He believed that to a large degree, these differences are influenced by race, culture, family, and individual personality and that of utmost importance in education are the differences found in styles of learning. He cited one of his previous research studies (1988) which found that white students preferred well-lighted learning environments, to learn in the afternoon, and to learn in several ways. Black students were more teacher and authority motivated and had a stronger preference for visual learning.

Jacobs' research results indicated differences in learning style between black students of varying academic levels. The black high achievers exhibited a weak preference for structure and learning in several ways. The high achievers were also more teacher motivated. The average achievers preferred to learn in late morning, as well as through auditory, tactile and kinesthetic channels. The low achievers were more persistent and preferred nonparental authority figures present while learning.

The author generalized by stating that the results of this study indicated that although blacks share unique cultural experiences, there are distinct individual differences in their learning approaches. It was his contention that culture, family, personality, and socioeconomic status affect the ways in which one prefers to learn. It

was also his contention that the most important issue facing educators is their willingness to understand and accept that students must be seen as individual information-processing beings who deserve the maximum benefits of the educational system regardless of the cultural group to which they belong. Jacobs concluded by stating that to deliver instruction that does not attempt to accommodate the individual learning styles of students - black or white, low or high achiever - disregards the multicultural and individual principles of this society.

Kalapos (1985) used the learning style inventory developed by Dunn, Dunn and Price (1975) in order to compare the learning styles of learning disabled children and gifted children at the elementary school level, to ascertain if differences in learning styles existed between the groups. The researcher stated that her study was important due to the fact that the educational process needs more than an emphasis on just learning environment and teaching style alone. She stated that teachers need to recognize the learning styles of their students and adjust the other two components accordingly, for meaningful learning to occur.

Significant differences in learning styles were found between learning disabled and gifted students in Kalapos' study. The learning disabled students were self-motivated, had shorter attention spans and wanted to please their parents and teachers. They liked structure, an authority figure present while they worked, and to partake in activities designed for learning. The gifted students were also self-motivated and wanted to please their parents and teachers. They however, had longer attention spans, a stronger desire to complete assignments, and a preference to work on assignments alone until completion.

Kalapos stated that these findings provide essential information about the

program, techniques, and materials that the student needs, in order to reach his/her potential in the school setting. She felt that teachers need to test individual students in order to determine their individual learning styles. Once the teacher is equipped with this information, he/she can design a classroom conducive to learning for all students involved. The results of this study clearly showed that learning disabled and gifted students have different needs in order to learn most effectively. Therefore teachers should take this information and create learning environments that help students learn both as a group and as individual learners.

A third researcher to use the Dunn, Dunn, and Price (1975) learning style inventory was Weber (1983) who set out to compare the learning styles of students who had been classified as perceptually impaired and those who had not been classified. Weber indicated that identifying ways in which a student learns best and constructing an environment to suit that style can enhance the student's potential for learning. Weber stated that programs should be designed to suit the learners rather than fitting the learners into standard programs, and that regardless of what definition or model of learning style one chooses to follow, knowledge of the learner's characteristic approach to processing information can only enhance teaching approaches. She noted that learning disabled students are frequently unable to learn under normal classroom conditions and that in fact, few people learn in the same way. She stated that the learning style approach in instruction improves academic achievement and attitudes toward school.

In Weber's (1983) study, she found that perceptually impaired students preferred quiet, bright lights, structure, the kinesthetic modality, and mobility while studying. They believed themselves to be self-motivated and peer oriented learners. They also felt that

they were responsible but not persistent. The non classified students also preferred bright lights, the kinesthetic modality, and believed that they were self-motivated and responsible. Unlike the perceptually impaired students, the non perceptually impaired preferred sound, needed little structure, felt they were persistent and preferred learning alone. The results of this study indicated that there were significant differences between the two groups in the following areas: sound, structure, persistence, and peer-orientation.

The researcher concluded that students are capable of accurately indicating ways in which they study. She found that students became more aware of their own learning style preferences as a result of administering the learning style inventory. She also concluded that as teachers question students about their learning style preferences, new insights will be gained, and that by making use of these insights, they may have positive influences in helping students to learn (Weber, 1983).

Implications for Students

Indeed, a substantial amount of research has been conducted in the area of learning styles which concludes that students from different groups have different learning preferences, but what are the implications for these students? Shirley Griggs (1989) set out to answer this question by looking at students' sociological grouping preferences of learning styles. She found that the most prominent mode of instruction in American classrooms was whole-group instruction by teachers. She also found that the climate within American classrooms was flat as a result of teacher domination of

instruction, with many students minimally involved in the learning process. She stated that students who learn from close student/teacher interaction should not be assigned to a system wherein independent or peer-group learning are emphasized. Conversely, students who achieve through interaction with their peers should not be placed in a program that requires either extensive self-study or teacher dominated instruction.

Griggs cited research which observed that low-income black children were members of primary family groups that emphasized shared-function or a global style of learning. She advocated an educational model that emphasized strong emotional support of the child through small group learning and peer tutoring. She implied that many low income black children failed to achieve academically because they were enrolled in classrooms that emphasized whole group instruction which failed to engage the child on an affective level in the learning process.

Griggs also cited research that studied the academically gifted child at every grade level and found generally that these youth would rather learn independently than with peers or through teacher dominated instruction. In contrast, were three studies which indicated that high school dropouts showed stronger preference for learning in varied ways, including self, pairs, peers, and teachers, than the comparison groups. Correlational data further revealed that the higher the grade level, the less teacher motivated students become. Although the high school years are considered strong periods for peer influence, there was greater need to learn and study alone among more students in grades nine, ten, eleven, and twelve than during any other interval.

Griggs summarized her overall research findings by stating that there are differences *between* low-income black youth and middle-class white youth, academically gifted and non gifted pupils, high school dropouts and students who

persist in school, and students at higher grade levels versus those in lower grades. These differences however, are less significant than the differences *within* groups. She contended that it would be a mistake to assume that special populations learn best through a single instructional strategy, because within any group there are students who learn best by themselves, students who learn best with peers, and students who need to work directly with the teacher.

Griggs concluded by citing research which indicated that students can accurately identify their preferred mode of grouping and that accommodating these preferences results in increased academic achievement and improved student attitudes toward school. When students are taught through styles that are congruent with their discovered preferences, they achieve significantly higher scores in a variety of skill and content areas and report more positive attitudes toward learning than under mismatched conditions.

Griggs strongly believed that we need to discard the outmoded format of whole group instruction within classrooms. Instead, students should be provided with choices that complement their learning preferences. She gave an example of a study by Dunn, Beaudry, and Klavas (1989) which demonstrated how easy it is for teachers to post an assignment with specific objectives and say to the class: "You may learn this alone, in pairs, in small groups, or with me. If you wish to work alone, sit wherever you will be comfortable in the room. If you wish to work with others, take a moment to decide where you will sit, but stay away from those needing to be by themselves". After a momentary pause, students who wish to work in a small group may move together quietly, and those who wish to work directly with the teacher may move to a designated section of the classroom.

Dorsey (1993) had very different findings in her investigation into the effectiveness of learning styles in a special education classroom. The purpose of her study was to explore how children are actively affected when taught according to their learning style preferences. It was also to determine whether there was validity in the existing research which supports the belief that teaching to a student's preferred learning style increases the chances for success in the classroom.

Dorsey's definition of learning styles was a uniquely brief one in stating that "if students don't learn the way we teach them, then we will teach them the way they learn". She contended that as the learning styles literature mounted in favor of implementing instruction to student's learning styles, more educators became enamored with its common sense approach. It made educators realize that they have a responsibility to their students to consider individual styles when delivering new or difficult material. Dorsey's literature proposed that matching and mismatching learning styles to the instructional method has serious implications for cognitive and affective learning.

Dorsey stated that education has serious problems, in that drop-out rates have sky-rocketed and that the problems of dealing with so many diverse student needs have impeded the function of the educational system. Therefore, the theory of learning styles is quite appealing to educators who wish to alleviate these pressing problems. Dorsey also felt that several factors have contributed to the growing interest in learning styles. One of these factors is that the learning styles movement fits in with the personalized view of education appropriate to the diverse populations found in schools today. Another factor is that learning styles focuses on an individual's strengths and not on their weaknesses. A final factor is the growing number of drop-outs. One

way to reach them is through learning styles. Dorsey proposed that drop-outs have the most severely mismatched learning styles with the way in which traditional schools use instruction.

The data generated from Dorsey's study indicated that students learn regardless of their preferred learning style. The researcher felt that teaching toward student learning styles was impractical for the general population, but that it may be of use to a minor population that has an extreme learning style. She stated that the uniqueness of human beings is the ability in which one may adapt to changing situations, and therefore children are able to learn in a variety of settings with a variety of different teachers, using a variety of techniques.

Dorsey concluded by noting that learning styles is a common sense approach to many of the school's pressing problems, but that schools must not lose sight of the fact that students learn regardless of their learning style preference. Each individual has learned to compensate and adapt to changing modes of instruction. Each human has their own modality preference, but the majority is able to adapt to any given situation. Dorsey's study demonstrated how individuals are able to compensate and conform to changing situations.

Like Dorsey and Griggs, McNeil (1991) indicated that evaluating and reducing drop-out rates was important. The purpose of her study was to measure freshman learning preferences, using the Myers-Briggs Type Indicator (MBTI). She compared MBTI learning preference data to predicted grade indices, first semester grade point averages, and sophomore return rate. The results were to be used to develop recommendations to improve freshman academic achievement and retention.

McNeil began with the preface that as a result of open access to higher

education, college students' learning style preferences have become more representative of the general population. Students entering American colleges have more practical and applied interests, compared to the more conceptual and creative students of ten to twenty years ago. She advocated that their learning styles differ from the professorate whose teaching styles tend to match *their* own unique learning styles. As a contrast, professors tend to be abstract thinkers, while students of this day appear to be more concrete in their thinking. As a result, the minority of students who represent abstract thinkers get the higher grades (McNeil, 1991).

McNeil stated that this may have a bearing on freshman retention rates. She suggested that students' knowledge of learning preferences would reduce drop-out risk and assist in their transition from high school. Matching their learning style to the best teaching environment for them would increase their academic success and therefore decrease the amount of students who drop-out.

McNeil's results indicated that freshman students tend to be uncomfortable with theory, synthesis, critical thinking, complex concepts and ambiguity. They prefer highly structured and practical situations. These results supported her theory that students tend to lean toward concrete thinking and away from the abstract. She concluded that successful integration between today's students and the institution may require appropriate interventions to address the diverse differences and needs stated previously.

McNeil postulated that a mere awareness of freshman learning style preferences can help them to achieve higher grades and consequently improve their retention rate, because doing well is an important factor for staying in school. Students who have trouble adapting their learning style preferences to accommodate a different teaching

style may experience academic frustration, dissatisfaction, underachievement, and may drop-out. Therefore strategies should be designed (possibly through a freshman seminar course) to help freshman develop the following:

1. an understanding of the strengths and weaknesses of their personal learning preferences
2. an adaption to the diverse teaching styles of the professorate
3. access to the appropriate campus academic support services

(McNeil, 1991).

Ramsden and Entwistle (1981) looked into the idea of incongruity between college student learning style and academic teaching style further, through reviewing the effects of academic departments on students' approaches to studying. Ramsden found in the past, that variability in approach or style was partly a function of differences between individual academic tasks. There was also evidence in Ramsden's study that students responded to the context of learning defined by the teaching and assessment methods of academic departments. For example, some departments and some lecturers seemed to facilitate a deep approach, while others used methods of teaching, or made course work demands which forced students into surface approaches (Ramsden, 1979). Ramsden and Entwistle's study put a different slant on the study of learning styles by using the Approaches To Studying Inventory and the Course Perception Questionnaire to explore the extent to which approaches to studying can be explained in terms of students' perceptions of their courses.

The researchers found that there was a clear indication that departments rated highly on good teaching and freedom in learning had students with higher average

scores on meaning orientation. Moreover, a positive evaluation of departments was associated with positive attitudes to studying, and positive attitudes as well as a deep approach was linked with academic progress. It then appears as if changes in teaching (good teaching, greater freedom, and an avoidance of overloading) are likely to move students away from surface and towards deep approaches to learning, and also to improved attitudes, thus improving the quality, at least of what is learned.

Ramsden and Entwistle further found students in their study who said that teaching style affected their learning style in many ways. Students who saw themselves as successful were more likely to see the course workload as reasonable and the teaching as satisfactory. Students do begin courses with preexisting and differing levels of ability, motivation and study skills. The approaches they adopt however, are shaped by the teaching, assessment, and course organization. Departments thus do have a responsibility for the efficiency of learning achieved by their students. What can be done to help students? Ramsden and Entwistle suggested study skills courses with a greater emphasis on matching strategies to specific tasks. More importantly however, they gave the following examples suggested by students of good teaching and freedom in learning which both facilitate learning.

Good teaching.

Staff make a real effort to understand the difficulties students may be having with their work.

The lecturers always seem ready to give help and advice on approaches to studying.

Lecturers seem to be good at pitching their teaching at the right level.

Freedom in learning.

Students seem to be given a lot of choice in the work they have to do.

Students have a great deal of choice over how they are going to learn. (Ramsden and Entwistle, 1981)

Cafferty (1980) put a different twist on the study of learning styles as they apply to students, through looking at learning style as a tool in career guidance. She felt that career guidance is more than just matching the skills and abilities of the individual with the skills and abilities required of the job. It is realizing that job satisfaction is related to meaningfulness of the job for the individual, and that many of the characteristics people prefer in the learning environments correspond to similar characteristics in the work environments.

A model for career guidance would then include an assessment which would measure one's preference for the work environment as well as the commonly used assessment of one's aptitude, interests, skills and abilities. It is the assessment of one's preference for the work environment that the researcher focused this study on, and she stated that a learning style inventory could help individuals identify preferences important in one's work environment. For example, it could identify factors such as whether one prefers working with peers or alone, has a preference for organization, attention to detail, knowing the instructor, or a preference for authority (Cafferty, 1980).

Through this assessment, an individual would identify which of these conditions were more highly preferred and which had a lower preference. For example, if an individual prefers to work with peers, have good relations with the students, and have student friends, then those jobs in which the person works with others the majority of the time would be more satisfying. The individual to whom organization is a high

preference would prefer a work setting in which the tasks to be accomplished were clearly outlined and there was a logical sequence of activities. If goal setting was an important characteristic for an individual, his/her job satisfaction would be enhanced if he/she was given the freedom and responsibility to set some of his/her own goals (Cafferty, 1980).

Another important aspect of the job market is competition. Competition, defined as desiring comparison with others and knowing how one is doing in relation to others, is a characteristic which we are often told is very important to our overall society, as well as to the business world. While some students thrive on competition however, we find many students who will retreat when competition in the classroom gets too high. In the world of work there are jobs that are highly competitive and others where competition is not so great. To the individual for whom competition is a preference, job success may be measured in how well he/she compares to his/her fellow employees and if in his/her judgment he/she compares favorable, it brings him/her satisfaction in his/her job. On the other hand, this kind of competition brings dissatisfaction to the individual with a low preference in this area.

Cafferty asserted that understanding one's learning style provides the student with self-knowledge about the kind of environment within which he/she prefers to interact. Comparing the characteristics of the individual to a complete task analysis of an occupation can provide more complete information on which the student can base his/her decision on whether to pursue that particular career. In fact, learning style is another dimension which may help the individual to select an occupation where the stimulus conditions of the tasks performed in an occupation will be positive reinforcers for the characteristics of the individual. In addition, information of their learning style

can help the individual select the organization where the stimulus conditions in the work environment will be positive reinforcers for the characteristics of the individual.

Implications for Instruction

To begin the evaluation of the impact that learning styles research has had on instruction, a paper presented at an educational conference will be evaluated. Chiarelott and Davidman (1983) discussed the general implications which learning styles inventories have had for the field of curriculum and instruction in their paper entitled Learning Style Inventories: Implications for Curriculum and Instruction. The findings in their paper supported the declaration made by Rita Dunn, a learning style inventory creator when she stated:

> most children not only can tell you how they learn, they want to and are delighted that you asked. What causes the problems is that no one is affected by all the elements of learning style. Obviously students can't tell you about any personal reactions to elements that aren't important to them. But where an element is either a very strong preference or a very negative preference, most children can describe their feelings about it and reactions to it very well (in Chiarelott & Davidman, 1983).

Chiarelott and Davidman noted that practitioners and theorists were defining and diagnosing learning style in a variety of ways. Some practitioners and theorists were relying on systematic experience-based observation to classify learners, while others were using well defined checklists to guide the classroom observation of teachers. The

diversity of definitions and approaches to learning style diagnosis and prescription is an indication first, that the learning style "idea" has stimulated the imagination of educators, and second that a refinement process is under way. Based on these developments, the researchers contended that learning style discovery has moved from a skeptical, experimental phase, where the link to instructional decision-making was tenuous and fairly uncommon, to a middle phase wherein teachers will more frequently use data about learning style characteristics to make basic instructional and curriculum decisions.

Chiarelott and Davidman, after examining the many diagnostic instruments and approaches, stated that it appears that learning style has successfully made the leap from research, development and scattered usage to a level of acceptance and curriculum development which should translate into school and district-wide utilization. In other words, practitioners are ready to utilize learning style data to help create more favorable learning environments for individual students.

Drummond and Stoddard (1992) agreed that much attention has been directed recently to the importance of the construct of learning style in education. They cited Butler (1988), who postulated four major advantages of the assessment of learning style. First, it facilitates instructors' examining how they themselves learn. Second, it forces instructors to examine whether they have developed or masked their own learning styles. Third, it forces teachers to examine whether they are harming or frustrating their students by how they teach and fourth, the knowledge provides a basis for planning strategies to help students who have different learning styles including styles different from their teachers' style. Teachers can vary the type of learning style necessary for learning and offer the students choices. The researchers suggested that by also increasing the students' repertoires of tactics for learning, teachers can prepare

them to develop their own strategies for problem solving in the classroom by placing emphasis on teaching strategies.

The purpose of Drummond and Stoddard's study was to investigate the relationship between the Gregorc Style Delineator of learning styles and the Myers-Briggs Type Indicator for personality to explore the construct validity of the Gregorc Style Delineator because they felt that the general view of learning styles is one on thinly developed theory and weak instruments, supported by fragmented research, often in settings not typical. What they found was a pattern of relationships between the Gregorc Style Delineator and Myers-Briggs Type Indicator which indicated that the Gregorc measures some of the same dimensions as the Myers-Briggs but uses different labels. This suggested that learning styles are clearly related to personality type.

Faggella and Horowitz (1990) on the other hand, see learning styles as related to seven distinct intelligences: linguistic, logical, spatial, musical, kinesthetic, interpersonal and intrapersonal (described in more detail in their article, "Different Child, Different Style"). We each posses all seven, though one or more may be stronger than others. This tendency toward greater strengths in certain types of intelligence over others can make a difference in many areas of our lives: from *preferred learning styles*, to the things that interest us both in school and out, to our career choices later in life.

Faggella and Horowitz advised that teachers can put this research on intelligence to work in their classroom. By being more aware of their students' learning styles, they can encourage those "at promise" in a particular intelligence, provide intervention for those "at risk", and help all students find their own niche in learning and life. They suggested bearing in mind that while every child possesses all seven intelligences, some are stronger in certain areas than others, and some students will have very

pronounced strengths in one or two intelligences.

Faggella and Horowitz reminded instructors that providing opportunities to stimulate children in the ways they learn best might mean that more than one type of project is going on their classroom at any one time. To pull it off, the teachers need to recognize when they need to call on specialists and resource people from their school and community to help out. For example, the librarian can suggest colorful books and informative films, the art teacher can help with arts and crafts, the music teacher can incorporate song and dance and the physical education teacher can include games related to study. They could also invite people from the community who have succeeded in fields related to different intelligences to discuss their occupations and how they relate to the topics the class is studying. The authors concluded with the idea that when we recognize and foster our students' different interests and styles, we let them know that they have valuable contributions to make to their own lives and to our world.

Guild (1989) is the author of a paper entitled Meeting Students' Learning Styles which presented instructors with the notion that a variety of patterns appear in a typical classroom. Guild stated that teachers, who have their own preferred learning and teaching styles, can also assume that each student uses a variety of learning patterns. Because teachers frequently teach the same way they learn, conflict often results between teaching and learning styles within the classroom. Overcoming this involves three steps. First, teachers need to be aware of the problem. Second, they need to identify dominant student and teacher styles and find potential areas of conflict. Third, and most challenging, they must cultivate alternative teaching methods to include students who are not being reached by existing strategies.

Guild went on to identify the following typical learning-style patterns found within individual students:

1. Generalists enjoy understanding the big picture before focusing on specifics.
2. Active students enjoy hands-on, exploratory experience.
3. Group learners enjoy relationships and working in groups.
4. Verbal students like to think as they talk and to put ideas into words.
5. Logical students like structure and rules for new material to be presented clearly, with examples that build from the simple to the complex.

Understanding learning-style needs can help break ineffective teaching patterns and add variety to teaching. Guild, like Faggella & Horowitz suggested turning to colleagues and students for ideas. He stated that because learning style approaches usually work for each student, carefully planned variety will give many students opportunities for success. He advised teachers to give students choices in assignments or on tests so that students can choose options that utilize their strengths. He also suggested varying teaching activities throughout the week or the unit. Guild then presented further suggestions for teachers in specific subject areas (See Guild, 1989 for further information).

To conclude, Guild brought technology to the forefront, stating that even standard equipment like overhead projectors, videocassettes, recorders and slide projectors can increase teaching effectiveness by addressing students' individual learning patterns. Technology can help students learn more readily through processing information in their own natural way, whether they rely most heavily on visual or auditory techniques. Educational technology can fulfill the need for materials that reach students with different perceptual styles by offering a variety of visual and/or auditory channels.

Applying Learning Styles Techniques

A learning style program was introduced in the Brightwood Elementary School in Greensboro, North Carolina, by principal, Roland Andrews in 1986. He decided to try the learning orientation due to low CAT scores and behavioral problems. He administered a learning style inventory to determine students' learning styles. He found that their profiles clearly showed that their learning styles required changes in how they were being taught. Many of the children were poor readers and most of their teachers relied on teaching-by-talking. They were unaware that the majority of their students were "low auditory", and could not remember three quarters of what was said during a forty to fifty-minute lesson. On the other hand, although the children were not auditory, they were highly tactual and/or kinesthetic. Tactual learners tend to master difficult material with their hands, and kinesthetic learners master difficult material with their bodies through movement and activities (Klavas, 1994).

Andrews' learning style program required teachers to teach the students through their primary preference first, then through their secondary preference, which was followed by verbal reinforcement as the children answered questions about the lesson. This procedure introduced students to difficult information through their strongest preference and then reinforced it through their secondary preference. With that background, they then were able to learn by listening.

Other findings indicated that 65 percent of the students were most alert in the afternoon and therefore teachers reversed their previous schedule of teaching reading and math "first thing in the morning", and scheduled reading right after lunch with math following after a short break. Due to their strong kinesthetic needs, Andrews and his staff decided to allow children to work anywhere in the classroom as long as they:

* completed their assignments;

* worked quietly so that no one could hear the actual words they were saying;

* earned better grades than before; and

* made certain that their learning style did not interfere with anybody else's style (Klavas, 1994).

Prior to the learning styles program at Brightwood, teachers used either direct instruction *or* small group techniques with everyone. After they began teaching to the students' learning styles, they assigned only peer oriented students to cooperative learning groups and permitted independent students to work by themselves. The most immediate result of the learning style approach implementation was an improvement in student behavior, with a dramatic decline in the number of discipline problems. For example, during the 1985-1986 school year, there had been 143 discipline referrals: there were only 14 in the 1988-1989 school year and 6 in the 1990-1991 school year. The worst-behaved fifth graders became the best-behaved sixth graders, when the fifth-grade teachers reversed their schedule and taught reading and math in the afternoon at the students' best time of the day. Most rewarding however, was a steady gain in Brightwood's California Achievement Test Scores from the 40th percentile in reading and math in 1987 to the 83rd percentile by 1989 (Klavas, 1994).

Two professors, Rita Dunn and Shirley Griggs (1989) traveled to many schools using Learning Styles Techniques in order to interview administrators (such as Andrews), teachers, and students, as well as to observe the classes in progress. Some of the programs were launched with the support and guidance of administrators (as with Andrews); others were designed by the teachers. These researchers found students working on identical objectives but, in almost every case, they were permitted to work

either alone, in a pair, with a small group, or with the teacher - whatever they preferred. Within many of the schools, students had been taught to capitalize on their most preferred channel, with the instructors reinforcing the difficult material through the students' secondary modalities, as noted in Andrews' program. Many students in these schools had also been shown how to do their homework through their preferred styles. A few schools used computerized homework discs into which each youngster's major characteristics were recorded. These discs then provided students with individual printouts for studying and doing their homework through their strengths. In several programs, class schedules had been made with an eye toward individual preferences for learning at specific times of the day. Most classes provided youngsters with varied assignments that included options to respond to differing needs for structure or choices, variety or patterns, and self-direction or teacher direction. The best schools however, were deeply into converting their instructional objectives into resources that taught the same material differently to students who learned differently.

Dunn and Griggs noted that none of the schools' principals reported that teaching to students' learning styles cost any more than conventional education, and that without exception, they all demonstrated the increased achievement across-the-board which resulted from attending to students' learning preferences. A greater number of students began passing all of their subjects for the first time. At one school, of the failing youngsters, 64 percent passed and many earned Bs and better after enacting the learning style program. At another school, at-risk students completed high school through learning with *their* style (which consisted of needed breaks, interaction, sound and bright light).

Beyond the benefits to their students, many of the teachers confided that they

had "come alive" in the program. Several reported that the new emphasis on styles had given them a sense of "really helping" their students. One administrator said that he felt as if he "was doing the most important thing in education - teaching children how to teach themselves!"

Summary of the Literature Review

The literature review clearly indicates that learning style is related to many different variables, including the following: teaching style (Ramsden & Entwistle, 1981); job satisfaction (Cafferty, 1980); personality type (Chiarelott & Davidman, 1983); and distinct intelligences (Faggella & Horowitz, 1990). Most of the researchers, however seem to imply that learning style is an individual preference to learn in a certain way and that there are differences in learning styles between different groups of individuals (Weber, 1983; Kalapos, 1985; Biberman & Buchanan, 1986; Griggs, 1989; Jacobs, 1990; Titus et al., 1990; Trayer, 1991; Henson & Schmeck, 1993; Matthews & Hamby, 1995).

Good students or those labeled as "gifted" are described in the following ways: as assimilators, whose strengths lie in reasoning and creating theoretical models (Trayer, 1991); as needing little structure and a variety of learning assignments (Jacobs, 1990); as having long attention spans and the desire to complete assignments (Kalapos, 1985); and as having a strong desire to work independently while learning (Kalapos, 1985; Griggs, 1989).

Those generally described as poor students are described in the following

contrasting ways: as needing a lot of structure (Weber, 1983; Kalapos, 1985); as having short attention spans (Kalapos, 1985); as needing non-parental authority figures present while learning (Jacobs, 1990); and as being peer-oriented in the learning process while also needing quiet (Weber, 1983). Drop-outs are described as needing variety (Griggs, 1989) which is also interestingly enough, a proposed learning orientation of those labeled "gifted". Drop-outs are also however, described as having the most severely mismatched learning styles with the traditional instruction found within classrooms (Dorsey, 1993).

Older students have been found to have different learning styles, in that college seniors tend to be more abstract than college freshman (Titus et al., 1990); college students in general tend to be divergers (imaginative & feeling oriented) and accommodators (getting things done & seeking new experiences) while high school students tend to be assimilators (reasoning & creating theoretical models) and convergers (solve problems & make decisions) (Matthews & Hamby, 1995); and older students prefer to learn and study alone more than younger students (Griggs, 1989).

Freshman college students differ from the rest of the college population in the fact that they tend to be concrete thinkers, possibly due to the open-access of education which allows more representation from the general population than years ago (Titus et. al., 1990; McNeil, 1991).

Gender has been considered an issue in many of the research findings. One study found that senior males were closest to adult norms in abstract thinking than freshman females, which suggests that age and gender may both be involved in the maturation of learning style (Titus et al., 1990). Two other studies however, indicate that there is no significant difference in learning style based on gender (Magolda, 1989;

Matthews & Hamby, 1995).

Despite the differences in interpretation of learning styles found within different groups, most of the researchers seem to agree on one thing. Most agree that the most effective form of instruction matches a student with his or her preferred learning style (Ramsden & Entwistle, 1981; Weber, 1983; Kalapos, 1985; Dunn & Griggs, 1989; Griggs, 1989; Jacobs, 1990; Henson & Schmeck, 1993; Klavas, 1994; Matthews & Hamby, 1995). Recommendations include delivering instruction to accommodate individual learning styles, creating environments which help students learn most effectively, and providing choices for students in order for them to create their own success. All of the researchers in agreement on this issue believe that enacting the learning style approach in education would increase academic success for students. Those who do not suggest matching students with their preferred style of learning, (Biberman & Buchanan, 1986; Guild, 1989; McNeil, 1991; Trayer, 1991; Drummond & Stoddard, 1992; Dorsey, 1993) all state that teachers should provide a variety of teaching techniques so that all students will have an equal chance of learning regardless of their preferred learning style. One researcher has pointed out that humans have the ability to adapt to learning situations, and most of the researchers agree that students need to learn how to adjust to differing learning environments. Most of the researchers in agreement on this issue however, feel that learning style preferences are very real and that teachers should be aware of them.

In fact, most of the research studies reviewed by this investigator focus on the fact that learning styles differ between groups, are important, and should be recognized by the educational community. In addition, a majority of this research concludes that it is important to match these different groups with their preferred

learning style. Therefore, it is this researcher's contention that it is important to investigate the learning style differences between groups of students located within different types of colleges, and particularly, to investigate whether there are learning style differences between community college and four-year college students. Findings are important in order to determine whether different forms of instructional techniques between colleges would be warranted.

The Research Questions

Are there learning style differences between General Psychology students at Salem Community College in New Jersey versus General Psychology students at Rowan College in New Jersey? Are there learning style differences between males and females within this college student population?

CHAPTER III

METHODOLOGY

Sample

The sample included 16 General Psychology students from Salem Community College, and 29 General Psychology students from Rowan College. Both of the colleges were rural and located in Southern New Jersey. Their was a total of 27 female college students and 18 male college students who participated from both Salem Community College and Rowan College combined.

Instrumentation

All students answered The Learning Styles Inventory created by David Kolb (1985). The Learning Styles Inventory was developed originally for college students and is most relevant for predicting the learning styles of a college student population. The Inventory is a simple self-description test, based on experiential-learning theory. Respondents are required to rank-order twelve sets of four descriptive phrases from 4 (most preferred) to 1 (least preferred). Each of the twelve sets begins with an open-ended phrase, followed by the four choices. Each of the four sentence endings corresponds to one of the four learning orientations: Concrete Experience, Abstract Conceptualization, Active Experimentation, and Reflective Observation. Forced-choice ranking produces a score for each of these learning orientations ranging from 12 to 48. Two combination scores result from the formulas: Abstract Conceptualization minus Concrete Experience and Active Experimentation minus Reflective Observation; these scores range from +36 to -36.

After the participants complete the twelve items, calculations are performed which when the numbers are plotted on a Cartesian coordinate grid, they determine the learning style of the individuals as a Diverger, Assimilator, Converger, or Accommodator. If participants' intersected points are found to lie between two quadrants, they are said to have characteristics of two styles. If the intersected points are toward the middle, then there is no strong preference for any style.

Kolb and Smith (1986) reported that the four basic scales and two combination scores generated by the 1985 Learning Styles Inventory show "very good" internal reliability as measured by Cronbach's Standardized Scale Alpha. Reliability coefficients (N = 268) ranged from .73 to .88. Sims (1986) reported reliability coefficients (N = 619) for the four basic scales of The Learning Styles Inventory as ranging from .76 to .85. With 619 students, he also found test-retest reliability results for three administrations of the 1985 Learning Styles Inventory over a five-week period with coefficients ranging from .24 to .66. As evidence of validity, Kolb and Smith (1986) provided data showing that persons in particular fields of study tend to exhibit learning styles expected of them based on Kolb's theory.

Procedure

All two-year and four-year college students responded to the instrument in a classroom setting. They were told that research was being conducted on learning styles among college students and that their participation would supply instructors with information on college student learning style preferences, so that instructors could teach students more affectively according to those preferences. Directions were stapled to the questionnaire, asking the students to indicate their sex on the top, right hand corner

of the first page of the survey. The students were assured that the results of the survey would remain anonymous and were also told to write their social security number on the top, right hand corner of the front page of the survey ONLY if they wanted their results returned to them. Administration took place at the beginning of the class period and lasted approximately fifteen to twenty minutes (see the appendix for a copy of the instrumentation that was utilized).

Data Analysis

The proportion of students preferring each learning style was the unit of analysis. The two-tailed *t* test was used to indicate differences in proportions between the community college and four-year college students and sex subgroups. The alpha level of acceptance was .05. Percentages of each group's learning style preferences were also presented and graphed.

CHAPTER IV

RESULTS

The first question asked if four-year college students and two-year college students differed in learning style preferences. Table 1 presents percentage values for the proportion of two-year college and four-year college students preferring each of Kolb's four learning styles.

TABLE 1

Percentage Values for the Proportion of Four-Year College and Community College Students' Preferences by Learning Style

	Diverger		Assimilator		Converger		Accommodator	
College	*n*	%	*n*	%	*n*	%	*n*	%
Four-Year	8	27	11	38	4	14	6	21
Two-Year	6	38	7	48	2	12	1	6
	$t = 0$ df = 43		$t = -.58$ df = 43		$t = -1.20$ df = 43		$t = .91$ df = 43	

Higher proportions of the four-year college students indicated a preference for the Accommodator style (15 point difference), and higher proportions of the two-year college students indicated a preference for the Diverger style (11 point difference). There was no statistically significant difference found among college students in relation

to learning style when a *t* test was performed, however.

The second question asked about the relationship of sex to learning style preferences in the two groups. Table 2 presents percentage values for proportions of male and female students preferring each of the four learning styles.

TABLE 2

Percentage Values for the Proportion of Female and Male Preferences by Learning Style

	Diverger		Assimilator		Converger		Accommodator	
College	*n*	%	*n*	%	*n*	%	*n*	%
Female	11	41	9	33	2	7	5	19
Male	3	17	8	44	4	22	3	17
	t = 1.65 df = 43		*t* = -1.95 df = 43		*t* = -1.19 df = 43		*t* = 1.68 df = 43	

Higher proportions of female students indicated a preference for the Diverger style (24 point difference), and higher proportions of male students indicated a preference for the Assimilator style (11 point difference) and the Converger style (15 point difference). There was no statistically significant difference found among learning styles in relation to sex when a *t* test was performed, however.

DISCUSSION

The findings of this study indicated that there were reported differences in learning style preferences between four-year college and community college students, as well as between male and female college students. The *t* test performed however, found no statistically significant differences, causing the researcher to retain the null hypothesis. Perhaps statistically significant differences would have been found if a larger sample size were used, representing college students from various regions across the country. It is important to note that there were higher percentage differences between students on some of the learning styles than on others. This demonstrated that students tended to report stronger preferences for one type of learning style over another.

Learning style preference differences were reported through the following findings:

* a larger percentage of four-year college students selected the Accommodator style (21%) than two-year college students (6%)

* a larger percentage of two-year college students selected the Diverger style (38%) than four-year college students (27%)

* a larger percentage of female college students selected the Diverger style (41%) than male college students (17%)

* a larger percentage of male college students selected the Assimilator style (44%) and the Converger style (22%) than female college students (33% & 7% respectively)

Conclusions made on this data in accordance with the meanings associated with

each learning style would ascertain that four-year college students reported to prefer learning situations which enable them to carry out new plans and experiments, and be involved in new experiences while getting things done, more than two-year college students. They also reported a more task oriented learning style, as well as a preference to rely on other people for information more than two-year college students. Two-year college students however, reported a preference for learning situations which enable them to view concrete situations from many perspectives and a preference to use their imaginative ability more than four-year college students.

Females in both groups, reported a greater preference for using their imagination over their male counterparts. Males in both groups however, reported a preference for learning situations which encourage the creation of ideas, concepts and theoretical models, as well as the ability to solve problems and make decisions more often than their female peers.

Overall, college students in both groups reported a preference for learning environments which foster creativity in generating ideas and working with others, as well as a preference to have the opportunity to create theoretical models. It is interesting to note that most of the students reported a preference for a learning style which represents the belief that ideas and concepts are important, and that although a theory must be sound and just, it does not have to be practical.

The completed learning style survey and a learning style category list were both presented to those students who specified that they would like their learning style results returned to them (see appendix). The Learning Style Category List specified the learner type associated with each learning style category. It included the following information for the students:

Accommodators are dynamic learners who seek hidden possibilities and need to know what can be done with things. They learn through trial, error, and self-discovery. They are very adaptable to change. They also like variety and excel in situations that call for flexibility. They are risk takers, and are at ease with other people. Their favorite question is "What can this become"?

Divergers are imaginative learners who seek meaning and need to be involved in things personally. They learn through listening and sharing ideas. They are interested in people and culture, and like to model themselves on those they respect. They function best through social interaction. Their favorite question is "Why or why not"?

Assimilators are analytic learners who seek facts and need to know what the experts think. They learn by thinking through ideas and they like to form reality. They are less interested in people than they are in ideas and concepts. They critique information and like to collect data. They enjoy traditional classrooms because schools are designed for their type of learning style. Their favorite question is "What"?

Convergers are common sense learners who seek usability and need to know how things work. They learn by testing theories in ways that seem sensible. They like to use factual data to build designed concepts and prefer hands-on experiences. They enjoy solving problems, resent being given answers, and restrict judgment to concrete things. They also want to know how things can help them in "real life" and do not like "fuzzy" ideas. Their favorite question is "How does this work"?

Chapter II includes a review of a research study very similar to this study, which compared the learning styles of community college versus university students. The study similarly found no significant mean difference between the two groups (Henson & Schmeck, 1993). Further researchers however, have cited important research studies completed, which have supported the notion that there are in fact differences in learning styles between different groups of individuals (Weber, 1983; Kalapos, 1985; Biberman & Buchanan, 1986; Griggs, 1989; Jacobs, 1990; Titus et al., 1990; Trayer, 1991; Henson & Schmeck, 1993; Matthews &Hamby, 1995).

Additional research cited in Chapter II which supports the reported preferences indicated by students in this study, includes the finding that college students in general tend to be Divergers (Mathews & Hamby, 1995), and the finding that males and females tend to exhibit different learning styles, with males tending to be more abstract (Titus et al., 1990). A study by Garvey (1984) also supported the findings in this study due to the fact that it also found that males prefer the Converger style more often than females. In contrast, other studies have found no significant difference in learning style based on gender (Magoida, 1989; Matthews & Hamby, 1995).

This researcher recommends that a variety of methodologies be used in both four-year college and community college classrooms to accommodate the variety of students present. It was clear from this study that students exhibited many different kinds of learning style preferences regardless of the group to which they belonged. If instructors use a learning style inventory in order to determine the learning style preferences of their classes, they will probably find that every class will have all styles represented. Using a lesson plan that includes activities appealing to all of these styles may help ensure higher achievement and better attitudes among students in their

classrooms.

The findings from this study must be considered as preliminary and pilot in nature, because of several weaknesses. The research occurred in only one state with unequal samples - a larger sample from the four-year college group than the community college group. The selection of schools was also not random. It should be noted that although this study found (insignificant) percentage differences in learning style preferences between groups, the cause of these percentage differences was not addressed. Further research should be conducted to explore the possible *causes* of learning style differences between differing groups of student populations.

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APPENDIX

I am currently conducting research on Learning Styles among college students. This research aims to supply instructors with information on college student learning style preferences so that instructors can teach students according to their students' learning style preferences. Your participation will be strictly confidential and you will remain anonymous. Your participation is also greatly appreciated and will contribute to research on effective college instruction. This questionairre will take less than 10 minutes of your time.

Please indicate your sex on the top, right hand corner of the learning style questionairre. If you would like the results of your learning style preferences returned to you, please write your social security number on the top, right hand corner of the questionairre also. Follow the instructions on the top of the questionairre when you are ready to begin, and when you are finished, please turn the questionairre over.

Thank you again for your participation in this study.

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go about learning something. Using the spaces provided, write a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn. Be sure to rank all the endings for each sentence.

	A	B	C	D
. When I learn:	____I like to deal with my feelings.	____I like to watch and listen.	____I like to think about ideas.	____I like to be doing things.
. I learn best when:	____I trust my hunches and feelings.	____I listen and watch carefully.	____I rely on logical thinking.	____I work hard to get things done.
. When I am learning:	____I have strong feelings and reactions.	____I am quiet and reserved.	____I tend to reason things out.	____I am responsible about things.
. I learn by:	____feeling.	____watching.	____thinking.	____doing.
. When I learn:	____I am open to new experiences.	____I look at all sides of issues.	____I like to analyze things, break them down into parts.	____I like to try things out.
. When I am learning:	____I am an intuitive person.	____I am an observing person.	____I am a logical person.	____I am an active person.
I learn best from:	____personal relationships.	____observation.	____rational theories.	____a chance to try out and practice.
When I learn:	____I feel personally involved in things.	____I take my time before acting.	____I like ideas and theories.	____I like to see result from my work.
I learn best when:	____I rely on my feelings.	____I rely on my observations.	____I rely on my ideas.	____I can try things out for myself.
.When I am learning:	____I am an accepting person.	____I am a reserved person	____I am a rational person.	____I am a responsible person.
.When I learn:	____I get involved.	____I like to observe.	____I evaluate things.	____I like to be active.
.I learn best when:	____I am receptive and open-minded.	____I am careful.	____I analyze ideas.	____I am practical.
TOTALS	COLUMN A=	COLUMN B=	COLUMN C=	COLUMN D=

Dear College Student,

Thank you for taking place in my study on college student learning styles. Hopefully the information that I will now provide you with in relation to your individual learning style will help you to further understand your educational strengths. This understanding can be used to increase your success both in the classroom and work environment, by increasing your awareness of the way in which you learn best.

The learning style category in which you have scored the highest has been highlighted in red on the back of your survey. Please refer to the learning style category list that I have provided, in order to determine your learning style strengths. Please keep in mind that although I have only highlighted your highest score, you may have more than one learning style for which you have a high score. This is clearly illustrated on the back of your survey, on the learning style grid.

Learning Style Category List

1. **Accommodator** - Your greatest strength lies in getting things done, carrying out new plans and experiments, and being involved in new experiences. You are task oriented and rely heavily on other people for information rather than on your own analytic ability to gather information.

As a dynamic learner, you seek hidden possibilities and need to know what can be done with things. You learn through trial, error and self-discovery. You are very adaptable to change. You also like variety and excel in situations that call for flexibility. You are a risk taker, and are at ease with other people.
Your favorite question is "What can this become?"

2. **Diverger** - Your greatest strength lies in imaginative ability and in the ability to view concrete situations from many perspectives. You excel in generating ideas and working with people.

As an Imaginative learner, you seek meaning and need to be involved in things personally. You learn through listening and sharing ideas. You are interested in people and culture, and like to model yourself on those you respect. You function best through social interaction.

Your favorite question is "Why or why not?"

3. **Assimilator** - Your greatest strength lies in the creation of theoretical models. Ideas and concepts are important to you, and although a theory must be sound and just for you, it does not have to be practical.

As an analytic learner, you seek facts and need to know what the experts think. You learn by thinking through ideas and you like to form reality. You are less interested in people than you are in ideas and concepts. You critique information and like to collect data. You enjoy traditional classrooms because schools are designed for your type of learning style.

Your favorite question is "What?"

4. **Converger** - Your greatest strength lies in the ability to solve problems and make decisions. You do best in situations where there is only one correct answer to a question or problem.

As a common sense learner, you seek usability and need to know how things work. You learn by testing theories in ways that seem sensible. You like to use factual data to build designed concepts and prefer hands-on experiences. You enjoy solving problems, resent being given answers, and restrict judgment to concrete things. You also want to know how things can help you in "real life" and do not like "fuzzy" ideas.

Your favorite question is "How does this work?"

BIOGRAPHICAL DATA

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