AN ANALYSIS OF LEARNING OUTCOMES OF ADULT STUDENTS:

LEARNING STYLES VERSUS TEACHING STYLES

by

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A Research Paper

Submitted in Partial Fulfillment of the
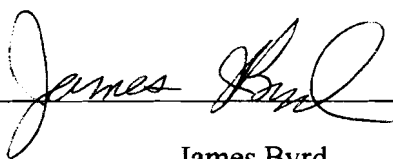
Requirements for the

Master of Science Degree

In

Career and Technical Education

Approved: 2 semester credits

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August, 2006

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Title: *An Analysis of Learning Outcomes of Adult Students: Learning Styles*
            versus Teaching Styles

Graduate Degree/ Major: MS Career and Technical Education

Research Adviser: Byrd, James.

Month/Year: August, 2006

Number of Pages: 50

Style Manual Used: American Psychological Association, 5th edition

ABSTRACT

This study identified the learning styles of adult students enrolled in the Mechanical

Design Technology and the Printing and Publishing programs at WCTC during the spring

semester of 2006, and identified the teaching styles of the instructors of these programs during

the same semester. Student learning styles were assessed using the Gregorc Style Delineator

(GSD), while data from instructors were collected by means of the Principles of Adult Learning

Scales (PALS) online questionnaire. The GSD is designed to reveal four specific learning styles.

While all four learning styles were found to be present, concrete learners accounted for 31 of the

42 students while only 11 students were identified as abstract learners. Of the three classes that

were surveyed, a moderately strong relationship was found in one class, while little or no

relationship was found in the other two classes between the students final grades and their

learning styles. The PALS is a self-assessment instrument that measures the frequency with

which one practices teaching/learning principles described in adult education literature. Of the seven teachers that responded to this survey, all of them preferred a teacher-centered approach to learning. This result also showed that students' regardless of their learning styles can learn just as effectively, even when the instructor's teaching style does not match the students' learning styles.

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Chapter 1

Introduction

Adult learners are loosely identified with a larger group characterized as "non-traditional" students, and they are the new majority on many college campuses today. Only about one quarter of American college students attend full time as residents, while nearly half can be defined as adult learners (Council for Adult and Experiential Learning [CAEL], 1999). The traditional undergraduate is characterized by the following (National Center for Education Statistics [NCES], 2002-012):

- Earns a high school diploma
- Enrolls full time immediately upon completion of high school
- Depends on parents for financial support
- Does not work during the school year, or works part time

In 1999-2000, just 27% of undergraduates met the above criteria. This means that 73% of all undergraduates were in some way "non-traditional" students. The undergraduate population in 1999 that fit this definition was 72% larger than in 1970, and there were proportional older students on campus as well: 39% of all postsecondary students were 25 years or older in 1999, compared with 28% in 1970 (National Center for Education Statistics [NCES], 2002). Non-traditional students will have one or more of the following characteristics (NCES, 2002-012):

- Have delayed enrollment into postsecondary education
- Attends school part time
- Works full time while enrolled
- Is considered financially independent
- Has dependents other than a spouse

- May be a single parent

- Does not have a high school diploma

The traditional student is no longer considered typical in higher education. Non-traditional students, adult learners, now make up the majority of the students in higher education. According to Knowles (1980), andragogy is an attempt to develop a theory specifically for adult learning, that is, that adults are self-directed and are expected to take responsibilities for their decisions. Adult learning, or andragogy is premised on four crucial assumptions about the characteristics of the adult learner that are different from the assumptions of pedagogy, or the "teaching of children." These four assumptions are:

1. Their self-concept moves from dependency to independency or towards self-directedness.

2. They accumulate a wealth of experience which can be used as basis from which to build learning.

3. Their readiness to learn becomes oriented towards developmental tasks of social rule.

4. Their time perspective changes from one of delaying the application of knowledge to one of immediate application of knowledge.

Today's economy, along with globalization and out-sourcing has put an ever increasing pressure on the adult community for further education in order to remain a viable commodity to their current employer, or to be able to seek other employment. "Participation in learning is voluntary; adults engage in learning as a result of their own volition" (Brookfield, 1986, p. 9). "It is important to involve learners in the process of setting their own direction and means of learning and evaluation as a way of facilitating their personal autonomy and self-direction" (Merriam, 1993, p. 19). Both of these authors suggest that the decision to learn is the adult learner's own. External circumstances such as being a displaced worker, employer requirements,

or divorce will certainly have major impact on the learning experience of the adult learner, and whether or not the teaching style of the instructor will have any effect on the learning experience.

The purpose of teaching is to help students learn (Byrd, 2003). "Helping adults learn is a transactional process in which the adult educator interacts with learners, content, other people, and material to plan and implement an educational program" (Galbraith, 1991, p. 3). Teachers need to be able to structure the learning experience regardless of the subject, to generate interest and attentiveness from the students (Knowles, 1973). According to Knowles, the behavior of the teacher probably has the greatest influence on the learning climate (cited in Hayes, 1989). The teacher's attention should be focused on the teaching style that will motivate the students to give extra effort and not on the educational philosophy of the teacher. Most educators will have one or perhaps two dominant philosophies on which their teaching is based. It is important for these educators to recognize that a mismatch between their teaching philosophies and educational objectives can be a significant barrier to learning (Zinn, 1991). Years of past research have shown that there is not a single dominant teaching style that might be called "good teaching" (Ross-Gordon, 2002). In today's world of adult education, there is no one dominant style or "one size fits all" method of teaching. The teacher is an essential part of the educational process (Leung, Lue, & Lee, 2003), and studies have confirmed that students learn more from good teachers. Good teaching can also be used to encourage better learning from students, and better teaching and learning can have an impact on the overall quality of life (Fink, 2003). Teachers must not only be knowledgeable in classroom instruction and able to put this knowledge into practice, but they must be able to understand their own practice which is reinforced and refined by practical experience (Jarvis, 2004).

Everyone's experience of learning is not the same (Schmeck, 1988). One learner might describe the learning experience as the retention of knowledge through memorization and repetition, while another might describe it as interpreting meanings and trying to understand reality. The style of learning and the motive for learning rests within the student and in most cases relates to past experiences and genetics. All learners differ in their general ability and their preference for processing information and being able to apply that information to meaningful situations (Jonassen & Grabowski, 1993). Every learner also has different abilities when it comes to performing school based activities or real world activities. One learning style may be used for classroom learning, while another style may be used for "real life or hands on" learning. Different tasks require different skills and abilities, and different learning styles. While the learner may have one predominant learning style, the specific situation or task could dictate the learning style needed to accomplish the desired outcomes. The style of learning cannot be observed directly, but modes of behavior within specific situations and how students perceive and approach the classroom situation will indicate a preferred learning style. Adult students are continually engaged with the process of learning, and they have already acquired ways of coping with this learning process (Rogers, 1996). Over the years every student has developed specific strategies and patterns for learning that they are most comfortable with, and that help them learn quicker, easier, and effectively. While every individual develops one or more preferred learning styles, all learning styles will be used at some point throughout the educational process. Most everyone will favor one style over another and learn more effectively, but the majority of students will be able to adapt to uncomfortable situations, which in turn will strengthen their weaker styles.

Past research has shown that when students' learning preferences match their instructors' teaching style, students' motivation and achievement usually improve (Galbraith, 1991; Stevenson & Dunn, 2001), and that mismatch of these styles could lead to complete misunderstanding of relevant topics (Schmeck, 1988). A number of learning style theorists also agree on the theory that the students will enjoy the learning experience more when they can use their preferred learning style (Bonham, 1989). Other studies have shown that matching teaching and learning styles are not an effective determination as to whether this match up has any effect on students' learning outcomes (Brown, 2003). Adult students, as well as adult education teachers, face many challenges in today's learning environment, such as: what are the learning styles of students enrolled in technical colleges, will students learn best when their learning style matches the teaching style of the instructor, or can students learn just as effectively regardless of the teaching style used?

Waukesha County Technical College (WCTC) is one of 16 technical colleges in Wisconsin that is governed by the Wisconsin Technical College System. WCTC offers Technical Certificates and Degrees/Diplomas in programs such as: Business, Education, Electronics & Engineering, Hospitality & Culinary, Nursing, Printing & Graphics, Protective Services, and Skilled Trades. The Mechanical Design Technology program is a 67 credit Associate of Applied Science Degree program which falls under the Electronics & Engineering area of study. Graduates from this program assist engineers by preparing technical drawings either manually or with the assistance of computer aided drafting, utilizing the latest CAD applications. These students are well versed in all aspects of manufacturing processes to include: strengths of materials, basic mechanism, and 3-D modeling. Graduates from this program can also take advantage of the transfer program with Milwaukee School of Engineering and apply most credits

towards their bachelor's degree in Mechanical Engineering Technology. The Printing and

Publishing program is a 68 credit Associate of Applied Science Degree program which falls

under the Printing & Graphics area of study. Students study in the world class Harry V.

Quadracci Printing and Graphics Center and learn every step of the printing process.

Statement of the Problem

Much has been written about the relationships between learning styles and teaching styles

and the importance of this relationship. This relationship can be especially important for

returning adult students, for they face enough anxieties and fears just by the thought of returning

back to the classroom. Students should not be stressed out by the uncertainty of the learning

experience or whether or not their learning style is compatible to the teaching style of the

instructor. Fear of learning should not be a deterrent to educational progress (Drysdale, Ross, &

Schultz, 2001).

Purpose of the Study

The purpose of this study was twofold. One, to identify the learning styles of adult

students enrolled in the Mechanical Design Technology and Printing and Publishing programs at

WCTC during the spring semester of 2006, and to identify the teaching styles of the instructors

of the Mechanical Design Technology Printing and Publishing programs during the same

semester. Two, to determine if any relationship exists between students' final grades and their

learning style, and whether or not their learning style can be adjusted to accommodate the

instructors' teaching style. Data used to identify the learning styles of the students will be

collected by the means of the Gregorc Style Delineator, while data from instructors will be

collected by means of the Principles of Adult Learning Scales (PALS) online questionnaire. The

Gregorc Style Delineator is a self analysis tool designed to measure two dimensional patterns of

individual learning preferences used to make sense of the world through awareness and orderly methods of receiving information. This instrument classifies the learner into one of four characteristics: concrete sequential (CS), concrete random (CR), abstract sequential (AS), and abstract random. The PALS is a self-assessment instrument consisting of forty-four items that measure the frequency with which one practices teaching/learning principles described in adult education literature. A high score indicates a learner-centered approach to teaching, while a low score supports a teacher-centered approach.

Research Questions

This study will address the following questions:

1. What are the learning styles of the adult students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC?

2. What are the teaching styles of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC?

3. Is there any correlation between student grades and their learning style?

4. Will students be able to adjust their learning style to accommodate the instructors' teaching style?

Importance of the Study

This research is important for the following reasons:

1. The study of teaching style starts with each educator's beliefs and values. The purpose of studying style is for educators to better understand their beliefs and how those beliefs are harmonious with their own philosophies toward teaching (Ross-Gordon, 2002). Teachers of adult students should be made aware of their teaching style and shown how to adjust their own philosophy of teaching for more effective instruction.

2. Adult learners now make up the majority of the students in higher education. Everyone has a dominant style when it comes to learning, and these style characteristics will provide each individual learner with a roadmap to better understanding and appreciation of their learning styles (Gregorc, 1982). Knowing one's own learning style can ease the anxiety and challenges of the learning process.

3. Students have their own way of learning and teachers will generally teach based on past experiences and on their own educational philosophy. Matching learning styles to teaching styles is not always feasible, so therefore students should be made aware of their learning styles and provided with a structured outline for learning based on their personal characteristics. Teachers should also be able to identify the learning styles of all students and determine if a relationship between their grades and the match or mismatch of students learning and instructors teaching style (Stevenson & Dunn, 2001)

4. Continuing education and "lifelong learning" are the lifeblood of the technical college system. Results of this study can be used by educational administrators to help create adult learner curricula and to better understand the learning and teaching process.

Limitations of the Study

This research is limited in the following ways:

1. WCTC offers numerous areas of study and a variety of certification and degree programs. Every program is unique in its offerings along with the demographics of the students, and research into every program would be well beyond the scope of this study. Therefore, data were collected only from the Mechanical Design Technology and the Printing and Publishing programs at WCTC.

2. The data were collected only during one semester and reflects students' and instructors' perception. Their perceptions may change over time and the data should not be used to generalize to other semesters, students, or instructors.

3. The Mechanical Design Technology and the Printing and Publishing programs are open to students of all ages and gender, therefore the participants in this study varied. There was no control concerning who might have enrolled during the semester.

4. The measurement tools used in this study were not the sole criteria for educational diagnosis. An adult's participation in learning is voluntary and certain factors such as personality characteristics, motivation, or other external circumstances can play a vital role in the ability to learn.

5. The most widely used instrument used to assess a teacher's preference for a learner-centered or a teacher-centered learning style in the adult education setting is the Principles of Adult Learning Scale (PALS). Therefore the teaching style measurement relied solely on the results obtained from (PALS).

6. There are numerous learning styles claimed by various researchers in this field. (Schmeck, 1988). In order to make the data manageable, the learning style measurements relied solely on the results obtained from the Gregorc Style Delineator.

Definitions of Terms

Key terms used in the research on the learning outcomes of adult students are:

Adult learners – any adult who is exposed to learning either by being enrolled in a program of study or by self dedication. According to Simpson (1980), there are two main characteristics that identify the adult learner. They are: the use of personal experience as a

learning resource and the learner's own self-sufficiency in setting learning goals or objectives (Brookfield, 1986).

Adult education – the process of bringing together adults, teachers, and institutions of higher learning in an effort to accomplish a specific set of educational objectives. This process is used by adults for their self-development either alone, or working with others, and by all institutions that are concerned with the education of adults, and that work towards common goals of improving the methods and materials of adult learning. To extend the opportunities for adults to learn and advance the general level of our culture (Knowles, 1980)

Andragogy – the art and science of helping adults learn (Knowles, 1980). The learning is student-centered, in contrast to pedagogy, where the learning is teacher-centered.

Educational philosophy – a set of personal beliefs and attitudes towards the educational process. A set of personal characteristics and interpersonal skills that exude an image of understanding, caring, trust, and encouragement (Galbraith, 1991).

Learning style – the characteristic way in which a learner operates within the learning environment (Hayes, 1989). The preferred method of processing information and constructing meaning from it, and applying it to new situations (Jonassen, & Grabowski, 1993).

Non-traditional students – student who have delayed enrollment into higher education and have more of life's daily pressures and expectations other than the learning process.

Pedagogy – the art and science of teaching children (Knowles, 1980). Teacher directed instruction as to what will be learned, how it will be learned, when it will be learned, and if the material has been learned.

Teaching style – the traits and qualities that a teacher has and displays in the learning environment that are consistent regardless of the situation and are in line with personal educational philosophies (Hayes, 1989).

Traditional students – generally characterized by one who earns a high school diploma and enrolls in higher education immediately upon completion of high school. These students are also generally able to direct most of their energy directly towards their studies.

Chapter 2

Literature Review

This chapter will discuss the concept of education pertaining to adult learners and review past literature on learning styles and teaching styles. Various learning styles will be analyzed as to their effectives when compared to teaching styles. A review of educational philosophies and their effects on the learning process will also be covered in this chapter.

Adult Education

Much has been written on the subject of adult education and the adult learner. Knowles (1973) formulated a theory about adult education that takes into account the experiences and characteristics of adult learners. Knowles himself became exposed to the term "andragogy" in the mid 1960's which was being used by his educational colleagues in Yugoslavia, and found that this concept described more accurately the concept of organizing ideas and thoughts.

Our traditional educational system is based more on students' achievements rather than on learning. Engaging students in learning through inquiry and knowledge-based learning has not been the primary focus. Assessments such as being able to pass tests or scoring high on college entrance exams seem to be the primary objectives in secondary education. The term "pedagogy," which literally means the art and science of teaching children, was being used to describe all levels of education, regardless of whether the students were children or adults. For many years it was assumed that teaching adults would be the same as teaching children. That is, that the same principles and techniques used in the education of children would also relate to adults (Knowles, 1980).

Adult learners, especially when their learning is voluntary and there is no degree involved, cannot be made to adhere to the pedagogical model of learning. Educators of adults

have also known for some time that they had to adjust some of the accepted academic standards in order to provide meaningful and rewarding learning and "keep" their adult students.

The Theory of Andragogy

The emergence, in the 1970's, of new theories and technology about adults as learners have eased the feelings of guilt that adult educators felt whenever they would deviate from traditional teaching methods. These educators were now being recognized and respected for their creativity and foresight and knowing all along that their methods of teaching would result in better learning. It is important to point out that there is no clear-cut difference between teaching children and teaching adults. Traditionally there have been assumptions made by those who practice pedagogy which sharply contrasted with the practice of andragogy. Pedagogical assumptions are real, and should be practiced, but as children become more independent, there should be a gradual shift towards the andragogical end of the continuum.

The theory of andragogy is based on assumptions that are different from pedagogy. Some of these assumptions are:

1. Changes in self-concept - As people grow and mature, they move from total dependency to being independent. They establish their own direction for learning.

2. The role of experience - There is an accumulation of knowledge and experience as people grow, and a decreasing emphasis on traditional teaching methods.

3. Readiness to learn - There is a readiness to learn the things that are needed, rather than the things that "ought" to be learned.

4. Orientation to learning - The orientation to learning is problem-centered in comparison to subject-centered learning to which children are exposed. This orientation is primarily due to the difference in the time perspective of children when compared to adults. Children

learn in order to advance to the next grade, or to get into high school or college. All of

this learning was learned in order to get to the next educational level or job level. The

adult comes to the learning experience because of current life inadequacies and is looking

to apply today's learning experience tomorrow.

Learning Styles

Every learner has a preferred learning style, which becomes evident when they are

required to interact with various models of instruction. The development of a preferred pattern

for engaging for physical, emotional, and mental requirements imposed by those learning modes

are known as learning styles (Jonassen & Grabowski, 1993). Learning styles are based on

personal responses to questions posed on various learning style measuring instruments. Since

responses are personal observations rather than ability tests, validity becomes one of the most

significant problems. There is nothing to prevent the learner from answering questions

erroneously or according to how they believe that others would want them answered. It is

arguable as to whether or not learning styles are a legitimate research tool, but regardless, they

are useful for self reflection and understanding one's own learning style. The following

instruments have been used extensively with learners of all ages to measure learning styles and

promote awareness to the learner and to encourage self reflection.

Hill's Cognitive Style Mapping

Cognitive style mapping (CSM) was developed by Joseph E. Hill, President of Oakland

Community College in Bloomfield Hills, Michigan, during the 1960s and 1970s. According to

Hill, the term "cognitive style" refers to the way students receive and process information

(DeBello, 1990). Hills' model of learning style contains three elements. They are: (1) the

processing of theoretical and qualitative symbols, (2) modalities of inference, and (3) cultural

determinants. A brief description of the three elements is as follows:

The processing of theoretical and qualitative symbols is subdivided into auditory and

visual categories of which each is further subdivided into linguistic and quantitative

symbols.

Modalities of inference are the assumptions a person uses in the process of obtaining

meaning. Specific elements include critical thinking, contrasting, comparison, and

relationships between events and theories.

Cultural determinants refers to how individuals interpret symbols and how the meaning

assigned to these symbols is shaped by one's culture, and that family and peers form that

persons main cultural influences..

The purpose of style mapping was to identify an individual's distinctive cognitive style

and create a personalized program for the most advantageous learning methods. After the initial

cognitive mapping of the individual, a personalized education program can be developed using

strategies that would capitalize on the learning preferences. Hill's cognitive style inventory has

been revised through the years, but it still remains rather complex (Hill, 1981; Curry, 1987, as

cited in DeBello, 1990) reported that this instrument showed no reliability or validity.

Kolb's Learning Styles

David A. Kolb (1984) defined learning style as an individual's preferred methods of

perceiving and processing information. His theory sets out four distinct learning styles which are

based on a four stage learning cycle. Therefore, Kolb's model works on two levels: a four stage

learning cycle and a four type definition of learning styles. The four stages of the learning cycle

are: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and

active experimentation (AE). The four definitions of learning style are: diverging (CE/RO), assimilating (AC/RO), converging (AC/AE), and accommodating (CE/AE). Each of these four combinations has unique characteristics that define an individual and their preferred learning style. The following is a brief description of the four Kolb learning styles:

Diverging (feeling and watching – CE/RO) – being able to look at things from different perspectives. These types of people are sensitive and prefer to watch rather than to do. This style is called diverging because these people tend to perform better in situations that require generating ideas, such as brainstorming. They also intend to be emotional, imaginative and strong in the cultural arts.

Assimilating (watching and thinking – AC/RO) – this learning preference is for precise, logical approach to situations and sound theories. Ideas and concepts are more important to this type of learner than people. They understand a wide range of information and are capable of arranging it in clear concise format. This style of learner prefers reading, lecturing, exploring, analyzing models and having the time to think things through.

Converging (doing and thinking –AC/AE) – this type of learner will use their style of learning to find solutions to practical issues. They prefer tactical tasks and are more concerned with the tasks at hand than with interpersonal relationships with people. They are capable of solving problems and making decisions by finding solutions to questions and problems. They are more attracted to, and more comfortable with technical tasks rather than humanistic issues.

Accommodating (doing and feeling – CE/AE) – this type of learner prefers the" hands-on" approach to learning and will rely on intuition rather than logic. They will more than likely act on gut feelings or instinct rather than on logical analysis. They would rather

rely on others for information rather than carry out their own analysis. They also prefer to work in teams to complete tasks and actively try different ways to achieve an objective.

Every learning style has its strengths and weaknesses which are a result of our heredity, our past life experiences, our future expectations, and the demands of daily life.

Dunn & Dunn Learning Styles

These learning styles measure a learner's preferred modes for concentration and learning difficult information. These measurement tools take into account multiple interacting elements, including environmental, emotional, sociological, physiological, and global versus analytical. Each of these five factors has its own sub-factors which could be refined further. While there are four instruments for measuring learning styles, the Productivity Environmental Preference Survey (PEPS) is the one that is administered to adults. This survey consists of 100 statements that draw out self-diagnostic responses on a five point Likert scale. This collected data yields a computerized profile of each student's preferred learning style based on the above five factors. Extensive research (Clark-Thayer, 1988; Nelson, et al., 1993, as cited in Stevenson & Dunn, 2001) utilizing these instruments has indicated that matching an individual's style and preferred strategies has resulted in significant gains in achievement.

Grasha-Riechmann Learning Styles

This instrument was first developed around 1970 and was constructed on the assumption that learning styles were describable in terms of three bipolar dimensions. (1) dependent vs. independent, (2) participative vs. avoidance, (3) collaborative vs. competitive. A brief description of each one is as follows:

Dependent vs. independent – students with a dependent style see the teacher a source of information and want to be told what and how to learn, while independent style students are confident and curious and prefer to work on their own.

Participative vs. avoidance – participative style students are eager to learn, enjoy the learning process, and take responsibility for their own learning. Avoidance style students are just the opposite, that is, they do not want to learn, they do not enjoy learning, and they avoid taking part in any group or class activities.

Collaborative vs. competitive – collaborative students work well with others and enjoy cooperative learning and group sessions and interactions, while competitive style students view the learning as a win-lose situation in which they must win.

Grasha and Riechmann devised items in order to measure each pole of each dimension, for a total of six scales. They then developed a 90 item inventory, with 15 items per scale, and a 5 point Likert response format. This instrument has since been shortened to 60 items, since the original version did not produce a factor structure corresponding to the dimensions it was supposed to measure (Ferrari, et al., 1996). This instrument however deals more with patterns of preferred learning styles for interaction with teachers and fellow students in a learning environment, rather than how information is perceived or organized or whether or not that information is processed correctly. This instrument is closely related to the Kolb Learning Style, which measures one's preferred method of perceiving and processing information. Since the type of styles measured by this instrument (Ferrari, J. et al., 1996) deal more with student/teacher interaction rather than the learning process, no conclusive implications can be drawn from their social preferences as to the strengths and weaknesses about learning strategies.

Gregorc Learning Styles

This instrument was created by Dr. Anthony F. Gregorc as a self analysis tool designed to measure two dimensional patterns of individual learning preferences used to make sense of the world through awareness and orderly methods of receiving information. This instrument, similar to the Kolb's learning style, classifies the learner into one of four characteristics. They are: concrete sequential (CS), concrete random (CR), abstract sequential (AS), and abstract random (AR) (Gregorc, 1982). The AR learner views the world as non-physical filled with feelings and emotions. The AS learner also views the world as non-physical, but the thinking process is based on intellect and the laws of logic. The CR learners' world is the concrete physical world which is used as a starting point or the background from which to carry out learning activities. The CS learners' world is also the physical "real" world in which everything is detectable through the senses of sight, sound, touch, smell, and taste. Experiences and approaches are ordered and defined. The thinking process, which deals with reality, is methodical, instinctive, and deliberate. Each of these combinations reveals a particular qualitative orientation to life, and while everyone is equipped to some point with all four characteristics, most individuals will usually use one or two dominant characteristics. This instrument helps individuals identify their predominant and most natural learning style.

Myers-Briggs Type Indicator

Katharine Cook Briggs and her daughter Isabel Briggs Myers developed the test during World War II, and this test is based upon Carl Jung's notions of psychological types. This instrument is the most reliable method for assessing student learning style. It was developed to measure a person's preference using four basic scales. These four scales are: 1) extraversion/introversion, 2) sensitive/intuitive, 3) thinking/feeling, and 4) judging/perceiving.

The first criterion, extraversion/introversion, defines the expression for a person, and where the source of that expression originates. The extroverts' source of expression is mainly in the external world while the introverts' source of expression is mainly in the internal world. The second criterion, sensitive/intuitive, defines the method of information perception by a person. Sensing means that a person believes mainly information received directly from the external world, while intuition means that a person believes mainly information received from the internal or imaginative world. The third criterion, thinking/feeling, defines how the person processes information. A thinking person makes decisions mainly through logic, while a feeling person makes decisions based on emotion. The fourth criterion, judging/perceiving, defines how a person implements the information he has processed. A judging person organizes all his life events and acts strictly according to his plans, while a perceiving person is inclined to just get by and seek alternatives. The various combinations of these preferences resulted in the 16 personality types that are possible from this survey. There are numerous claims that this inventory has helped to improve work and personal relationships and increase productivity. In the educational setting, many schools have used it for career counseling and personal awareness (Brightman, n.d.).

Teaching Styles

What characteristics should the adult educator possess that will enhance the teaching and learning interaction was a question posed by Galbraith (1991). Is it of paramount importance that the instructor is technically proficient in the content area of which the instruction is being presented? Galbraith pointed out that being technically proficient is not enough. The educator must also possess personality traits that exude an image of caring, trust, and genuine concern for the individual student. Knox (1980, as cited in Galbraith, 1991) suggested that an adult educator

should possess the following three specific areas of knowledge: knowledge of the content specific to the instruction, knowledge of the learners, and knowledge of the teaching methods to be used.

Adult educators should be able to recognize their philosophical orientation pertaining to adult education and reflect on their individual beliefs to shape the content and scope of what they will teach (Zinn, 1991). It is important for every teacher to have a personal philosophy of education, for these beliefs form some of the foundations for selecting instructional content, developing lesson plans, interacting with students, and being able to assess the learning outcomes.

Teachers in the field of adult education have a wide variety of backgrounds when it comes to their educational beliefs, or what they believe is their educational philosophy. These beliefs about how to teach, what to learn, and why adults learn, set the preliminary stage for facilitating learning. Being able to understand ones own educational philosophy can have a number of benefits such as:

1. Being able to develop methods of critical thinking (Phenix,1958, as cited in Zinn, 1991).

2. Being able to expand ones vision by enhancing personal meaning pertaining to adult education (Apps,1973, as cited in Zinn, 1991).

3. Being able to recognize and resolve conflicts between ones total life philosophy and ones educational philosophy (Phenix, 1958, as cited in Zinn, 1991).

4. Providing insight into the relationships deemed critical to adult education such as: student/teacher interaction, and the relevance of the subject matter to the learner and to the world in general (Maxcy, 1980, as cited in Zinn, 1991).

How does one formulate an educational philosophy? Apps (1989) proposed a general guideline that adult educators can follow to develop their own personal "working" philosophy on adult education. Apps suggested that educators reflect on their present working philosophy and build on it as needed, or whenever conflicting personal beliefs warrant it. He developed a framework that educators can identify with in a systematic way on their beliefs relating to adult education. This framework includes four elements: a reflection on our own beliefs about adults and the learning process, the goals or aspirations that we are striving for as a teacher, beliefs about the subject matter and how that content is presented from a teaching perspective, and beliefs about the adult student and the learning experience as it relates to instructional objectives and learning goals.

New teachers in adult education may not be certain of or may not yet have developed or fully understand their educational philosophy. Zinn (1991) developed the Philosophy of Adult Education Inventory (PAEI) test, which was designed to assist adult educators in identifying their own personal philosophy of education and comparing it with current philosophies in the field of adult education. The PAEI is a self-administered, self-scored, and self-interpreted test, that will present information about ones own beliefs. It is important to note that there is no "right or wrong" philosophy pertaining to education, and that this test is designed only to present information about personal beliefs and how these beliefs can influence ones actions as an adult educator.

Assessing Teaching Styles

While it is important to identify one's own personal educational philosophy, it is equally important to be able to assess one's own teaching style and how that knowledge will impact the learning environment. Teaching style refers to unique qualities that are displayed by the

instructor in all learning situations, regardless of the content of the material (Conti, 1991). "Much current educational practice can be categorized as either teacher-centered or learner-centered" (Conti, 1991, p. 81). The teacher-centered approach has been the dominant approach throughout the field of education and centers the learning around the teacher. It is assumed that the learners have no prior experience or knowledge and that the teacher's role is to introduce and re-enforce learning activities. The learner-centered approach to teaching is widely practiced in the field of adult education. This approach assumes that the learner has some prior experience and knowledge and is willing and able to share that knowledge in the classroom. Personal experience plays an important role in learning by focusing the learning around the student, rather than the teacher. Regardless of whether the educational process is teacher-centered or student-centered, adult educators should be aware of their teaching style in order to encourage better learning from students. Teaching style can be assessed using the Principles of Adult Learning Scale (PALS). This self-assessment instrument consists of forty-four items that measure the frequency with which one practices teaching/learning principles described in adult education literature. A high score indicates a learner-centered approach to teaching, while a low score supports a teacher-centered approach. While this instrument is useful for describing one's style, it is not the sole indicator. Other identifiable characteristics such as the diversity of the student population, the educational setting, and material content will provide additional information for making judgments concerning teaching style (Conti, 1991). Teaching style is not something that is randomly selected and constantly changed. A persons' teaching style is linked to ones educational philosophy and to ones personal learning experiences. This "natural" style should not be modified to try to emulate a teaching style from literature, but rather enhanced or refined to fit within ones personal life philosophies.

The idea of trying to do something about matching teaching styles to learning styles is a popular and novel idea among today's adult educators (Bonham, 1989). Wouldn't it be great if we could assess each individual's learning style and assign only teachers whose teaching style matches that student's style of learning, or maybe persuade that teacher to modify his/her teaching style to match the student's learning style? A number of learning style theorists (Barbe & Milone, 1980; Jenkins, 1988; Dunn & Dunn, 1993; Carbo, 1997b; Leaver, 1997; Sarasin 1999; as cited in Klein, 2003) (Woolhouse, 2003) agree on the theory that students will learn more readily and enjoy the classroom experience more when they can use their preferred learning styles. While students are sometimes punished unjustifiably when the classroom activity is incompatible with their characteristic way of learning, a popular approach to this dilemma would be to choose teaching methods that match the various learning styles. While this approach in theory would be great, reality would suggest that this approach could not be used in "real word" settings due to the variety of learning styles of the students within the classroom. Another idea would be to assess all learners to determine their preferred learning style and then to help them expand the range of that style and increase their learning comfort factor (Bonham, 1989). Matching Teaching Styles to Learning Styles

There are five important questions that need to be explored before deciding on how to match teaching style to learning style theories in the classroom (Bonham, 1989). What are we matching?

There are a number of learning style instruments and a number of teaching style instruments that can be used to measure and determine compatibility between the teacher and the learner. In some cases the same instrument is used to describe both the teacher and the learner, which therefore clearly defines what is being matched. In other cases, separate instruments are

used for the learner and for the teacher, and if the instruments are good, they will measure the same dimensions and comparative data can be easily matched. However, problems can arise when measured data from one instrument must be correlated with the data from another instrument, which seldom results in a close match.

What is the purpose of learning?

If a person needs to learn quickly how to operate a new piece of equipment, every effort should be made to try to match the method of instruction to that person's learning style. One-on-one instruction makes this possible, but in a classroom situation where there are numerous learning styles, it is not possible for the instructor to accommodate all styles. In this case, the learner needs to become more resourceful by trying to align more closely to the style of the teacher. There may still be a noticeable mismatch between the learner and the teacher, but simply stated, matching learning style to teaching style is always the best approach.

What effect does the learning content have?

Learners need to develop flexibility within their learning style. Most learning situations will probably require more than one learning style and at times the learner could be penalized by not being able to adapt or adjust to the learning style required to learn or understand the content. What other individual differences enter the equation?

Some learners and some teachers are extremely rigid when it comes to their preferred style of learning or teaching. They are so engrossed in their particular method that any change could be catastrophic in their teaching or learning approaches. While the long range goal should be to increase flexibility in the educational setting, the lack of flexibility may have to be taken into account. While some theorists hold to the belief that only the strongest held learning style should be taken into account, even if there is an attempt made to match the learning style to the

teaching style (Price, Dunn, & Dunn, 1982, as cited in Bonham, 1989). Some learners score near the midpoint of an instrument, that is, they have no clearly measured preferred learning style. In this case the teacher may find it unnecessary and unproductive to make an attempt to adjust the teaching style for these students.

What is the evidence that matching works?

Outcomes from past research (Terry, 2001) into matching teaching styles to learning styles have been as varied as the measurement instruments themselves. For example, some researchers have found reliability problems with Dunn and Dunn and Price's Learning Style Inventory (LSI) (Blixt & Jones, 1995; Hughes, 1992; Nagy, 1995; as cited in Terry, 2001)). Other researchers have found little or no evidence that matching teaching methods to learning methods improves the learning outcome. (Terry, 2001). One reason for such variety could have been that past researchers made different assumptions about the purpose of learning and the effects of the learning content. Another reason could have been that researchers failed to take into account other individual differences beyond what is typically referred to as learning styles, and how those differences could affect learning. While there are no conclusive results and inconsistencies exists as to whether a "matching" style produces better results than another style, studies have shown that a person with one particular style will outperform others regardless of the teaching method used (Woolhouse, 2003)..

Chapter 3

Methodology

This chapter will include information about how the sample was selected, a description of the sample, and the instruments being used. In addition, data collection and data analysis procedures will be given.

Participants

The first group of subjects for this study was two classes of adult students enrolled in the Mechanical Design Technology and one class of students enrolled in the Printing and Publishing programs at Waukesha County Technical College (WCTC) in the spring semester of 2006. The students' age or gender were not a factor in this study and therefore were not taken into account. The second group consisted of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC during the same semester. Again, age and gender were not an issue in this study.

Materials

The Gregorc Style Delineator was used to assess student learning styles, and the Principles of Adult learning Scale was used to assess teaching styles.

The Gregorc Style Delineator, created by Anthony F. Gregorc (1982), is a self analysis, self- administered instrument designed to reveal two types of mediation abilities: perception and ordering. Perception abilities are the abilities that a person has that allow the grasping of information. These perception abilities consist of two qualities which are classified as abstract and concrete. Ordering abilities are the ways a person systematically arranges, references, and disposes of information. These ordering abilities also consist of two qualities which are classified as sequence and randomness. The delineator consists of a 10 column word matrix. Each column

consists of four words which are to be ranked from four to one, four being the most powerful descriptor of oneself, while one being the least descriptor of oneself. The ranking scores are tabulated into four groups which will indicate the four learning styles, ranking them from the most powerful mediation qualities to the least powerful mediation qualities. The resultant learning styles that incorporate these mediation qualities are: abstract random (AR), abstract sequential (AS), concrete random (CR), and concrete sequential (CS). The abstract random learner views the world as non-physical filled with feelings and emotions. The abstract sequential learner also views the world as non-physical, but the thinking process is based on intellect and the laws of logic. The concrete random learners' world is the concrete physical world which is used as a starting point or the background from which to carry out learning activities. The concrete sequential learners' world is also the physical "real" world in which everything is detectable through the senses of sight, sound, touch, smell, and taste. Experiences and approaches are ordered and defined. The thinking process, which deals with reality, is methodical, instinctive, and deliberate.

The Principles of Adult learning Scale (PALS) was the instrument used to assess teaching styles. The total score on the PALS gives an indication of the teacher's overall preference for a learner-centered or teacher-centered teaching style in an adult education setting. This forty-four item instrument, developed by Gary J. Conti (1991), uses a modified Likert scale. It can be completed in less than fifteen minutes, and it can also be self-scored. To assess their style, teachers are asked to indicate the frequency with which they practice or deal with students and/or classroom situations described in each item.

Procedure

The students were given the Gregorc Style Delineator along with the UW-Stout implied

consent statement during one of the class sessions in the spring term of 2006. A discussion of

learning styles and explicit instructions on how to complete the delineator preceded the

distribution of the survey. Student participation was voluntary, so only completed surveys were

placed in an envelope. After all the surveys had been collected, the envelope was sealed and

taken by the researcher for analysis of the data. The resultant data was discussed individually

with each student at a subsequent class session.

The PALS instrument was re-created for online use using an electronic preparation tool

through UW-Stout which can be found at http://www.uwstout.edu/survey/. The instructors were

given the UW-Stout implied consent statement at the same time that the researcher collected the

e-mail addresses of the participants. A link to the survey was e-mailed to each instructor along

with a message indicating that participation in this survey was voluntary. A due date and

instructions on how to complete the survey were also included. The data was compiled and

exported to Excel for analysis. The PALS score which indicates the teacher's overall teaching

style and preference was then distributed and discussed privately with each instructor.

Data analysis

Surveys using the Gregorc Style Delineator were collected and manually scored by the

researcher. Students rank in order the ten sets of four words, putting a "4" in the box above the

word in each set which is the most powerful descriptor of oneself, a "3" for the word that is the

next most powerful descriptor, a "2" for the next, and a "1" for least descriptive of oneself.

Scores were then graphed within the Delineator which presented a graphic representation of the

four types of learning styles. 27-40 points indicates dominate learning styles, 16-26 points indicates intermediate learning styles, and 10-15 points indicates low learning styles.

The PALS online survey data was compiled and exported to Excel for analysis. The PALS survey is designed so that a point value is associated with each of the six possible responses; zero points for an "always" response, all the way up to five points for a "never" response. Scores were then summed up to indicate the teacher's overall teaching style. High scores reflect a learner-centered approach to teaching, while a low score reflects a preference for the teacher-centered approach. The overall PALS score was broken down further into seven factors which identified specific elements of the preferred teaching style. The seven factors are: 1) learner-centered activities, 2) personalizing instruction, 3) relating to experience, 4) assessing student needs, 5) climate building, 6) participation in the learning process, and 7) flexibility for personal development. A high score in each factor represented support of the concept of that factor, while a low score supported the opposite concept.

Chapter 4

Results

The purpose of this study was twofold. One, to identify the learning styles of adult students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC during the spring semester of 2006, and to identify the teaching styles of the instructors of the Mechanical Design Technology and the Printing and Publishing programs during the same semester. Two, to determine if any relationship exists between students' final grades and their learning style, and whether or not their learning style can be adjusted to accommodate the instructors' teaching style. This chapter will include the results of this study.

Student learning styles as measured by the Gregorc Style Delineator were analyzed. Of the forty two students that completed the self-assessment instrument, seventeen students (40.5%) were identified as Concrete Sequential learners; six students (14.3%) were identified as Abstract Sequential learners; five students (11.9%) were identified as Abstract Random learners; and fourteen students (33.3%) were identified as Concrete Random learners. The following bar chart summarizes these findings.

Learning Styles of Students
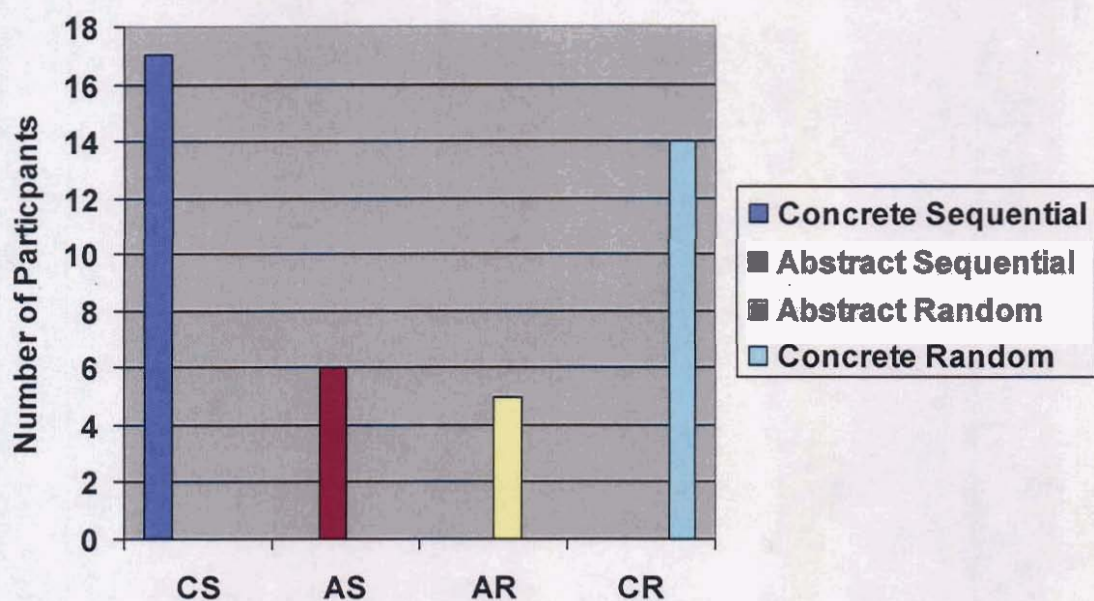
Final grades from the spring 2006 semester were collected from the three classes that

participated in this study and the student scores were recorded as percentages. .The percentages

equate to the following letter grades: 100-95 (A), 94.9-93 (A-), 92.9-91 (B+), 90.9-87 (B), 86.9-

85 (B-), 84.9-83 (C+), 82.9-79 (C), 78.9-77 (C-), 76.9-75 (D+), 74.9-72 (D), 71.9-70 (D-), 69.9-0

(F). Table 1 lists the grades that the students received in all three classes, along with their

respective learning style as determined by the Gregorc Style Delineator.

Table 1

Class 1		Class 2		Class 3	
Final Grade	Learning Style	Final Grade	Learning Style	Final Grade	Learning Style
83	CS	100	CR	98	AS
91	CS	98	AR	99	CR
85	CS	99	CR	95	CR
100	CR	97	AS	96	AR
85	AS	98	CS	92	CR
100	CR	100	CS	96	CS
100	CR	99	CS	95	CS
100	CS	97	AS	97	CS
98	AR	95	CR	98	AS
95	CS	90	CS		
96	CR	95	CS		
99	AS	96	AR		
98	CR	96	CS		
100	CR	99	CR		
		100	CS		
		92	AR		
		100	CS		
		98	CS		
		96	CR		

The number of participants, mean, and standard deviation of the three classes are shown

in Table 2.

Table 2

	N	Mean	Standard Deviation
Class 1	14	95	6.32
Class 2	19	97.1	2.70
Class 3	9	96.2	2.18

A Pearson r test for significance was run on Table 1 to determine whether a relationship

exists between students learning styles and their final grades, and what that level of significance

might be. Class 1 was a web publishing class in the Printing and Publishing program. The level

of significance for a one-tailed test with 12 degrees of freedom was: ($r=.62$, $p=.05$). The critical

value for Pearson r is .458, indicating that a moderately strong relationship exists. Class 2 was

one of the Industrial Occupation classes in the Mechanical Design Technology program. The

level of significance for a one-tailed test with 17 degrees of freedom was: ($r=.006$, $p=.05$). The

critical value for Pearson r is .389 indicating that little, if any relationship exists. Class 3 was the

second Industrial Occupation class in the Mechanical Design Technology program. The level of

significance for a one-tailed test with 7 degrees of freedom was: ($r=.23$, $p=.05$). The critical

value for Pearson r is .582 indicating that little, if any relationship exists.

The second group of participants in this study consisted of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC. This group was given the Principles of Adult Learning Scale survey to complete. Teaching styles were then assessed using this survey instrument. The instructors that participated in this survey were given their survey results. The following is the basis for the survey results:

The total score on the PALS gives an indication of the teacher's overall preference for a learner –centered or a teacher-centered teaching style in an adult education setting.

In the learner-centered approach, the authority for curriculum formation is shared by the learner and the teacher.

In the teacher centered approach, authority resides with the teacher.

High scores on the PALS reflect a learner-centered approach to the teaching-learning transaction. Low scores on PALS reflect a preference for the teacher-centered approach.

Scores near the mean of 146 indicate a combination of teaching behaviors that draw elements from both the learner-centered and the teacher-centered approaches.

The overall PALS score can be broken down into seven factors as shown in Table 3. While the overall score indicates the teacher's general style, the factor scores identify specific elements that make up this style. A high score on each factor represents support of the concept implied in the factor, while a low score indicates support of the opposite concept.

Table 3
Factor Score Values

Factor	Description	Mean	Standard Deviation
1	Learner-centered activities	38	8.3
2	Personalizing instruction	31	6.8
3	Relating to experience	21	4.9
4	Assessing student needs	14	3.6
5	Climate building	16	3.0
6	Participation in the learning process	13	3.5
7	Flexibility for personal development	13	3.9

Factor 1. Low scores on this factor indicate support for the use of formal testing and for the use of standardized tests as a means of comparing learners to established standards. High scores indicate an emphasis on informal evaluation techniques, on classroom behaviors that encourage students to take initiating actions, and on having students take responsibility for their own learning.

Factor 2. High scores indicate a preference for designing the learning situation to fit the individual needs of each student. Self paced learning is encouraged. Cooperation rather than competition is encouraged.

Factor 3. High scores indicate recognition of the importance of a student's prior experiences as an aid for learning.

Factor 4. High scores indicate a desire for finding out what each student wants and needs to know.

Factor 5. High scores reflect an attempt to establish a learning climate that is both physically and psychologically comfortable for the learner.

Factor 6. High scores indicate support for allowing students to identify the problem that they wish to solve and to participate in deciding the topics that will be covered in class. Likewise, students are involved in developing the criteria for evaluation of classroom performance.

Factor 7. Low scores indicate a view of the teacher as a provider of knowledge rather than as a facilitator.

Principles of Adult Learning Scale (PALS) Survey Results

Table 4 gives an indication of the teacher's overall preference for a learner –centered or a teacher-centered teaching style in an adult education setting. In the learner-centered approach, the authority for curriculum formation is shared by the learner and the teacher. In the teacher centered approach, authority resides with the teacher. Scores above the mean reflect a learner-centered approach to the teaching-learning transaction, while scores below the mean reflect a preference for the teacher-centered approach. Scores near the mean of 146 indicate a combination of teaching behaviors that draw elements from both the learner-centered and the teacher-centered approaches. Of the seven teachers' that responded to this survey, all seven of their scores were below the mean score of 146 which indicated that they all prefer a teacher centered approach to learning.

Table 4

Teacher	Score	Learner centered approach to learning	Teacher centered approach to learning
1	128		X
2	106		X
3	134		X
4	108		X
5	134		X
6	130		X
7	105		X

The overall PALS score can be broken down into seven factors as indicated in Table 5. While the overall score indicates the teacher's general style, the factor scores identify specific elements that make up this style. A high score on each factor represents support of the concept implied in the factor, while a low score indicates support of the opposite concept. In response to

factor 1, six of the seven teachers support learner centered activities. In response to factor 2, four

of the seven teachers support personalizing instruction. In response to factor 3, three of the seven

teachers support relating to experience. In response to factor 4, all seven teachers support

assessing student needs. In response to factor 5, four of the seven teachers support climate

building. In response to factor 6, three of the seven teachers support participation in the learning

process. In response to factor 7, five of the seven teachers support flexibility for personal

development. The tabulated results of the teachers' that responded to the survey are indicated in

Table 5.

Table 5

Factor	Description	Mean	Standard Deviation	Teacher						
				1	2	3	4	5	6	7
1	Learner-centered activities	38	8.3	46	26	39	34	39	35	33
2	Personalizing instruction	31	6.8	29	20	25	19	25	27	17
3	Relating to experience	21	4.9	19	14	13	16	13	20	15
4	Assessing student needs	14	3.6	14	14	15	11	15	11	11
5	Climate building	16	3.0	11	11	15	12	15	13	13
6	Participation in the learning process	13	3.5	3	9	15	8	15	14	9
7	Flexibility for personal development	13	3.9	6	12	12	10	12	10	7

Research question #1 – What are the learning styles of the adult students enrolled in the

Mechanical Design Technology program at WCTC? Students' learning styles were determined

by using the Gregorc Style Delineator. The Style Delineator is a research-based, self analysis

instrument designed to help reveal a special set of mental qualities and mediation channels

available for handling the demands and opportunities of life. Of the forty two students that

completed this survey, seventeen students (40.5%) were identified as Concrete Sequential

learners; six students (14.3%) were identified as Abstract Sequential learners; five students

(11.9%) were identified as Abstract Random learners; and fourteen students (33.3%) were

identified as Concrete Random learners.

Research question #2 – What are the teaching styles of the Mechanical Design

Technology program instructors at WCTC? This group was given the Principles of Adult

Learning Scale survey to complete. Teaching styles were then assessed using this survey

instrument. Of the seven instructors that completed this survey, all of them preferred a teacher

centered approach to learning. The factor scores from Table 2 are as follows:

Factor 1 – six of the seven teachers scored near the mean indicating an emphasis on

informal assessment techniques and encouraging students to take responsibility for their own

learning.

Factor 2 - four of the seven teachers scored near the mean indicating a preference for

designing the learning situation to fit the individual needs of each student. Self paced learning is

encouraged as well as using a variety of methods, materials, and assignments to enhance the

learning experience.

Factor 3 – only three of the seven teachers scored near the mean indicating recognition of

the importance of a student's prior experience as an aid for learning.

Factor 4 - all seven teachers scored near the mean indicating a desire for finding out what

each student wants and needs to know. This assessment is achieved through the use of informal

counseling and individual conferences.

Factor 5 - four of the seven teachers scored near the mean which indicates an attempt to establish a learning climate that is both physically and psychologically comfortable for the learners.

Factor 6 - three of the seven teachers scored near the mean indicating support for allowing students' to identify the problem that they wish to solve and to participate in deciding the topics that will be covered in class. Students are also involved in developing the criteria for evaluation of classroom performance.

Factor 7 – five of the seven teachers scored near the mean indicating their preference as facilitators rather than providers of knowledge.

Research question #3 – Is there any correlation between student grades and their learning style? A Pearson r test for significance was used to determine whether a relationship exists between students learning styles and their final grades, and what that level of significance might be. Class 1 was the web publishing class in the Printing and Publishing program. The level of significance for a one-tailed test with 12 degrees of freedom was: $(r=.62, p=.05)$. The critical value for Pearson r is .458, indicating that a moderately strong relationship exists. Class 2 was one of the Industrial Occupation classes in the Mechanical Design Technology program. The level of significance for a one-tailed test with 17 degrees of freedom was: $(r=.006, p=.05)$. The critical value for Pearson r is .389 indicating that little, if any relationship exists. Class 3 was the second Industrial Occupation class in the Mechanical Design Technology program. The level of significance for a one-tailed test with 7 degrees of freedom was: $(r=.23, p=.582)$. The critical value for Pearson r is .582 indicating that little, if any relationship exists.

Research question #4 – Will students be able to adjust their learning style to accommodate the instructors' teaching style? Of the four learning styles that were determined by

the Gregorc Style Delineator, all four styles were identified as being present in these students. The mean percent from all three classes was 96.1% which equates to an A as a final grade. This result showed that students' regardless of their learning styles can learn just as effectively regardless of the instructors' teaching style. This result however was inconclusive as to whether or not students actually adjusted their learning style.

Summary

This study had two purposes. One, to identify the learning styles of adult students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC during the spring semester of 2006, and to identify the teaching styles of the instructors of the Mechanical Design Technology and Printing and Publishing programs during the same semester. Two, to determine if any relationship exists between students' final grades and their learning style, and whether or not their learning style can be adjusted to accommodate the instructors' teaching style. Students were surveyed using the Gregorc Style Delineator to determine their learning styles. All four learning styles were found to be present which indicated that there was not one predominant learning style and all students learned just as effectively. The instructors were given the Principles of Adult Learning Scale survey to complete. Teaching styles were then assessed using this survey instrument and the instructors that participated in this survey were given their survey results. The total score on the PALS gave an indication of the teacher's overall preference for a learner –centered or a teacher-centered teaching style in an adult education setting. The data gathered indicated an overall preference for a teacher-centered approach to learning, while the specific elements in the seven factors favored a learner-centered approach to learning.

Final grades from the spring 2006 semester were collected from the three classes that participated in this study and the student scores were recorded as percentages. Of the four learning styles that were determined by the Gregorc Style Delineator, all four styles were identified as being present in these students. The mean percent from all three classes was 96.1% which equates to an A as a final grade. While all four learning styles were present, it should be pointed out that about 75% of these students were identified as concrete learners, who probably respond best to a teacher-centered teaching style. Since all seven instructors favor a teacher-centered teaching style, one could argue that teaching styles do match learning styles in this study. While the dominant learning styles were CR and CS, the results showed that AR and AS learners can learn just as effectively, even when the instructor's teaching style does not match the students' learning styles.

Chapter Five

Summary

Restatement of the Problem

Much has been written about the relationships between learning styles and teaching styles and the importance of this relationship. This relationship can be especially important for returning adult students, for they face enough anxieties and fears just by the thought of returning back to the classroom. Students should not be stressed out by the uncertainty of the learning experience or whether or not their learning style is compatible to the teaching style of the instructor. Fear of learning should not be a deterrent to educational progress.

Methods and Procedures

The first group of participants for this study was adult students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at Waukesha County Technical College (WCTC) in the spring semester of 2006. The students' age or gender were not a factor in this study and therefore were not taken into account. The second group of participants consisted of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC during the same semester. Again, age and gender were not an issue in this study. The Gregorc Style Delineator was used to assess student learning styles, and the Principles of Adult learning Scale was used to assess teaching styles. The Gregorc Style Delineator, created by Anthony F. Gregorc (1982), is a self analysis, self- administered instrument designed to reveal two types of mediation abilities: perception and ordering. The delineator consists of a 10 column word matrix. Each column consists of four words which are to be ranked from four to one, four being the most powerful descriptor of oneself, while one being the least descriptor of oneself. The ranking scores are tabulated into four groups which will

indicate the four learning styles, ranking them from the most powerful mediation qualities to the least powerful mediation qualities.

The Principles of Adult learning Scale (PALS) was the instrument used to assess teaching styles. The total score on the PALS gives an indication of the teacher's overall preference for a learner-centered or teacher-centered teaching style in an adult education setting. This forty-four item instrument, developed by Gary J. Conti (1991), uses a modified Likert scale. It can be completed in less than fifteen minutes, and it can also be self-scored. To assess their style, teachers are asked to indicate the frequency with which they practice or deal with students and/or classroom situations described in each item.

Major Findings

Every adult learner has a predominant learning style, which may or may not match the teaching style of the instructor. The surveyed students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC during the spring semester of 2006 showed that all four learning styles were present as determined by the Gregorc Style Delineator. Of the forty two students that completed this survey, seventeen students (40.5%) were identified as Concrete Sequential learners; six students (14.3%) were identified as Abstract Sequential learners; five students (11.9%) were identified as Abstract Random learners; and fourteen students (33.3%) were identified as Concrete Random learners.

The teaching styles of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC were assessed by having the instructors complete the Principles of Adult Learning Scale survey. Of the seven instructors that completed this survey, all of them preferred a teacher centered approach to learning, while the specific elements in the seven factors favored a learner-centered approach to learning.

Final grades from the spring 2006 semester were collected from the three classes that participated in this study and the student scores were recorded as percentages. Of the four learning styles that were determined by the Gregorc Style Delineator, all four styles were identified as being present in these students. The mean percent from all three classes was 96.1% which equates to an A as a final grade. While all four learning styles were present, it should be pointed out that about 75% of these students were identified as concrete learners, who probably respond best to a teacher-centered teaching style. Since all seven instructors favor a teacher-centered teaching style, one could argue that teaching styles do match learning styles in this study. While the dominant learning styles were CR and CS, the results showed that AR and AS learners can learn just as effectively, even when the instructor's teaching style does not match the students' learning styles.

Conclusion

Based on the results of this study, it can be concluded that all students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC have a predominant learning style, and that particular learning style does not have to be compatible to the instructors teaching style for effective learning. Every teacher has a distinctive teaching style based on a personal philosophy for education, and these beliefs form some of the foundations for selecting instructional content, developing lesson plans, interacting with students, and being able to assess the learning outcomes. The teacher centered approach to learning has been the dominant approach throughout the field of education and centers the learning on the teacher. The scores from the PALS survey given the instructors at WCTC indicated that all the instructors preferred a teacher centered approach to learning. Event though all instructors preferred a teacher centered approach to learning, the seven style factors within this survey indicated support for

learner centered activities. All students experience some degree of stress when it comes to learning regardless of the teaching style used, but the students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC can be re-assured that all instructors support learner centered activities and learning and teaching styles need not be compatible.

Recommendations

1. This study was limited to the students enrolled in the Mechanical Design Technology and the Printing and Publishing programs at WCTC, and to the instructors of the same programs. In order to yield more meaningful results, more programs at WCTC could be researched using this same study.

2. The Gregorc Style Delineator was the only instrument used to assess the learning styles of adult students. Using other learning style measurement instruments could be useful for comparative results, and how these instruments may overlap or differ.

3. The PALS was the only instrument used to assess the teaching style of the instructors of the Mechanical Design Technology and the Printing and Publishing programs at WCTC. Using other teaching style measurement instruments could be useful for comparative results, and how these instruments may overlap or differ.

4. There are nearly as many definitions of learning styles as there are theorists (DeBello, 1990), so learning style instruments should be chosen on their reliability and validity, and their desired outcomes.

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