Experiential learning in horticulture: influences of undergraduates' past experiences and learning styles on their learning

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Experiential learning in horticulture: Influences of undergraduates' past experiences and learning styles on their learning

by

Lynnette Arlene Davis

A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Agricultural Education

Program of Study Committee:
Cary J. Trexler, Major Professor
Cynthia Haynes
W. Wade Miller

Iowa State University
Ames, Iowa
2002

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Graduate College
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This is to certify that the master’s thesis of

Lynnette Arlene Davis

has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
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Abstract

Since the last half of the 20th century, renewed attention has focused on educational reform. Although many educators advocate changes at the university level, actual reforms are still relatively scarce. One reason why so few changes were documented could be that improving education is a complex and difficult process; many frame factors could potentially present barriers to student learning. This qualitative study of a horticulture and agricultural education class attempted to explore some possible barriers to undergraduate student learning: (1) preconceptions and (2) learning style. This study found that students’ preconceptions may be linked to their positive or negative reaction to an experientially-based course, but preconceptions did not appear to be linked to how much useful information students said they learned in the same course. There did appear to be a link, however, between the kind of knowledge gained and what students perceived as useful information. Instructors may benefit from exploring learning theory and employing a variety of teaching styles when helping their students to learn. Experientially-based undergraduate courses allow students to learn through all four phases of Kolb’s learning cycle and may lead to more versatile learners. Although students’ learning styles could not be linked to comfort and satisfaction in the course, most students reacted positively to the course. It may be beneficial to consider learning styles when designing and teaching courses to maximize student learning. Additional studies using these same qualitative methods would add to the body of knowledge regarding student-generated barriers to educational reform. This could lead to less student resistance to educational reforms and greater learning.
CHAPTER 1: INTRODUCTION

Undergraduate professional education, like education in the United States in general, has come under close scrutiny in recent years (Kunkel, 1992). Some go so far as to say that “the effectiveness and efficiency of the university and college campus is an emerging crisis” (Eddy, Murphy, Spaulding, & Chandras, 1998). The Boyer Commission (1996) described learning at the nation’s research universities in stark terms: many students routinely graduate without knowing how to think logically, write clearly, and speak coherently. Legislators, parents, students, government, accrediting bodies, industry, and business have all demanded that universities and colleges produce competent graduates (Eddy et al., 1998). Kunkel (1992) contended that graduates who can competently provide for the needs of a changing world will have the fundamental skills of “confidence, motivation, responsibility, effort, initiative, perseverance, caring, teamwork, common sense, and problem solving and persuasion abilities” (p. 2).

Calls to Reform

On the national level, calls to reform education have come from many sources. “The words educational change have permeated the professional literature and staff meetings of nearly every school...in the country” (Hargreaves, 1997, p. v.). The Kellogg Commission on the Future of State and Land Grant Universities (1999) stated that “changes are needed that reflect modern realities, challenges, and opportunities” (p. 11). The Boyer Commission’s 1996 report showed that there is a need to reform the dominant pedagogy of higher institutions – a pedagogy that often features professors delivering decontextualized knowledge to passive undergraduates.
On the collegiate level, responses to the challenge of producing a competent graduate have ranged widely. The Kellogg Commission suggested that agriculture colleges can enrich student education through engagement, which the Commission defined as the redesigning of institutions’ “teaching, research, and extension and service functions to become even more sympathetically and productively involved with their communities” (p. vii). Kunkel (1992) suggested that colleges of agriculture adopt multidisciplinary approaches — curriculum integration would move disciplines together to help produce graduates who can “think globally, to act creatively, to value diversity, to behave responsibly, and to interact cooperatively” (p. 2).

On the departmental level, some pioneering horticulture departments have tried to develop leadership, teamwork, and communication skills in their graduates, because they realize that they cannot teach students all the information needed in their futures (MacKay, Emerson, MacKay, Funnell, & Welsh, 1999). Some innovative agricultural education departments are implementing curriculum changes that include “the adoption of senior projects, colloquia, or other avenues” (Graham, 2001, p. 280) to develop skills in decision-making, problem-solving, and professional communication. These forward-thinking educators realized they can serve students best by encouraging them to use their understanding of basic principles to create new solutions to new problems.

**Problem Statement**

An extensive review of the literature uncovered many studies in agricultural education that advocated improvements in the dominant pedagogy of university teaching (Graham, 2001; Knobloch, 2001; Scanlon, 1995; Torres & Cano, 1995; Tripp, 1993; Woods, 2001). Fewer case studies, however, described implementation of such improvements in
university courses (MacKay, Emerson, MacKay, Funnell, & Welsh, 1999; Sorensen, Lunde, Dierberger, & McCallister, 1992; Koontz, Peel, Trapp, & Ward, 1995; Schuch, 2001). In other words, it appears that many university educators are talking about the need to improve teaching and learning, but few may actually be doing it.

One reason why so few educators had actually tried new ways to improve teaching may have been that improving education is a complex and difficult process. Lucas and Associates (2000) acknowledged this fact when they observed, “Many recent efforts at academic reform, though well-intentioned, have resulted in relatively little lasting improvement” (p. 74). They contended that any changes made to the educational system needed to be agreeable to “all parties” (Lucas et al., p. 72) – administrators, teachers, and students – before changes might be adopted.

Teachers and students, two of the three parties mentioned as part of the educational system, have long been “programmed” or conditioned into the status quo of the educational system and many may be comfortable with it despite its imperfections. According to Marshall (1991), “one cannot expect a system with entrenched values, standard operating procedures, and trained professionals who think they’ve been doing their best for years” (pp. 4-5) to accept change without reservation.

As a result of these entrenched values and standard operating procedures, many students traveled through the education system and created “perspectives” (Tuohy, 1999) or expectations of the education system. These expectations often led to student preconceptions of what the educational system should be like. The results of a previous study (Trexler, Davis, & Haynes 2002), caused the researchers to conclude that students’ preconceptions
often created barriers to their learning; if students encountered a learning environment that
did not match his or her preconceptions, learning was reduced.

This thesis was designed to further explore the conclusion of the Trexler et al. (2002)
study and focused on students, one of the three parties involved in education reform. This
study explored some possible barriers to learning: (1) student preconceptions and (2) student
learning style. First, students’ preconceptions of teaching and learning in a university
classroom setting were examined, and how these preconceptions affected learning in a new
educational environment were explored. Second, students’ individual learning styles were
determined and then compared with each student’s adaptations to an experientially- and
socioculturally-based classroom.

**Purpose and Objectives**

The purposes of this study were to:

1. Determine how students’ previous educational experiences affected their learning.
2. Compare students’ learning styles with their adaptations to an experientially-
   based learning environment.

The objectives of this study were to:

1. Identify students’ previous learning environments, their reaction to Hort/AgEdS
   282, and determine how much students believed they learned in the course.
2. Discover if there were connections among students’ previous learning
   environments, their reaction to the course, and how much they believed they
   learned in the course.
3. Identify learning styles of students and their satisfaction and comfort levels
   experienced in the course, and
4. Compare the eight students' learning styles with their satisfaction and comfort levels in Hort/AgEdS 282.

Limitations of the Study

There are several limitations to studies of this nature. First, because the study is qualitative, the results cannot be generalized to other populations. Here the reader must "test the fit" or make his or her own determination of the transferability to similar situations.

Second, because the researcher was the data-gathering instrument (Ary, Jacobs, and Razveigh, 1995), biases and personal experiences influenced the gathering and interpretation of the classroom data. According to Denzin and Lincoln (2000), "there are no objective observations....Any gaze is always filtered through the lens of language, gender, social class, race, and ethnicity" (p. 30). Realizing this, the researcher tried to "bracket" her biases by explicitly stating them prior to analysis of field notes. As with all ethnographic studies, "there is no single interpretive truth" (Denzin and Lincoln, 2000, p. 34). Another researcher might have interpreted the data differently, which would have subsequently led to different conclusions and recommendations.

Third, because the eight students interviewed volunteered for the study, different results might have been obtained if an alternate method was used in selecting students for participation.

Summary

Calls for education reform are not new, but actual reforms are still relatively scarce at the university level. One reason for the lack of reform may be the difficulty in bringing about change. This study attempted to describe how students' learning styles and their
preconceptions of university learning may have presented barriers to new teaching
techniques and learning environments.

**Thesis Organization**

This thesis is written in a modified format. It begins with a general introduction in
Chapter I, followed by an extensive review of the literature in Chapter II. Chapter III
contains a description of the methods used in the study. Chapters IV and V are devoted to
two professional journal articles. Implications, Conclusions, and Recommendations are
found in Chapter VI, followed by Appendices.

**Definition of Terms**

*Behaviorism*: learning based on observable behaviors exhibited by the student.

*Experiential learning*: learning based on doing and reflecting. Based on Kolb’s (1984)
experiential learning cycle, learning is a 4-stage process wherein learners (1) engage in
a concrete (oftentimes hands-on) experience, (2) reflect and make observations about
that experience, (3) develop abstract conceptualizations from the reflections, and (4)
actively experiment on the conceptualizations by applying their generalizations in a
new concrete experience (Fox & Ronkowski, 1997).

*Sociocultural learning*: learning based on getting information from others first and then
making it meaningful to the individual.

*Schema*: an interrelated network of cognitive structures in the brain that organize
information.

*Conception*: “a way of seeing something; a qualitative relationship between an individual and
some phenomenon” (Johansson, Marton, & Svensson, 1985, p. 236).
Conceptual change: Changes made at the level of the individual, requiring that he or she restructure knowledge by mental manipulation of concepts and principles.

Transition: process of letting go of old ways of thinking and behaving while at the same time learning new ideas and behaviors, which forces the individual to live with ambivalence until the process reached closure.
CHAPTER II: LITERATURE REVIEW

The literature review begins with an overview of educational reform, citing the observations of education experts in the last ten years. Ways to improve the current state of higher education are offered by experts, followed by university agricultural educators’ suggestions to bring about needed changes. Case studies describing changes in the current system are presented next. The last part of the chapter is devoted to a brief overview of behavioral, sociocultural, and experiential learning theories, followed by a short description of Kolb’s learning style preferences. Last, information is presented on conceptions, preconceptions, and resistance to change.

Educational Reform

Educational reform is not a new concept; teachers since Plato’s time have sought to improve the way teachers teach and learners learn. Since the last half of the 20th century, however, renewed attention has focused on educational reform. The combination of the political climate of the 1970s and 1980s (Posner, 1995) and the appearance in 1983 of the National Committee on Excellence in Education’s A Nation at Risk, a report on K-12 education, catalyzed this country into taking a hard look at all aspects of its educational practices as nothing previously had. Since then, experts have had much to say about the dismal state of the current educational system. Reform had been advocated at all educational levels. Hargreaves (1997) speculated that educational change had been discussed at nearly every school in the country since the early eighties. Because institutions of higher learning were steeped in tradition, they “tend[ed] to resist change” (Sims & Sims, 1995). When it came to improving learning, “the vast majority of the over 3,000 institutions of higher
education in the United States were satisfied with the results...obtained from the traditional pedagogy approach to education” (Sims & Sims, 1995, p. 150).

Critics

In 1998, Eddy, Murphy, Spaulding, and Chandras characterized the effectiveness and efficiency of college education as an emerging crisis. The Boyer Commission (1996) admitted, too, that the current higher education system had a poor track record in producing graduates who could think logically, write clearly, or speak coherently. Such graduates were sorely needed, Kunkel (1992) argued, to provide for the needs of a fast-changing world. The Kellogg Commission (1999) agreed, advocating that educational changes were needed and that these changes needed to “reflect modern realities, challenges, and opportunities” (p. 11). Phrased more theoretically, Tuohy (1999) proposed that critics were demanding that the educational system change from a passive orientation, in which students were encouraged to “accept the facts of history, of science and human experience” (p. 17) to a proactive orientation, where “the aim is to understand how situations arose, and to critically evaluate these processes and learn from them” (p. 17). Education commissions and experts were not the only ones dissatisfied with the current system; legislators, parents, students, government, accrediting bodies, industry, and business have all demanded that colleges and universities produce competent graduates (Eddy et al., 1998). Clearly, there has been a great outcry for educational change, and to complicate the process of change, a great number of suggestions have been offered to ameliorate the situation.

Studies Advocating Reform

Among those offering suggestions for reform was the Kellogg Commission (1999), which advocated “engagement;” that is, the redefinition of the functions of the college or
university to "become even more...involved with their communities" (p. viii). Another suggestion, offered by Kunkel (1992), was that a multi-disciplinary approach could produce competent graduates. He contended that moving disciplines together would help produce graduates who could "think globally, ...act creatively, ...value diversity, ...behave responsibly, ...and interact cooperatively" (p. 2).

Many researchers and professors in university agricultural education departments have urged their contemporaries to consider improving the dominant pedagogy of college and university teaching. In one such study, Graham (2001) assessed the needs of industry employers and found that business and industry wanted "society-ready" graduates who possessed skills of "teamwork, decision-making, leadership and initiative" (p. 269) as well as presentation skills, verbalizing, and computer proficiency. To produce such graduates, she advocated the implementation of curriculum changes to include such things as senior projects, colloquia, or other avenues.

Experiential learning was a favorite theme in agricultural education departments for improving teaching and learning. In his promotion for educational reform, Knoblock (2001) acknowledged that many aspects of agricultural education were traditionally based on learning by doing, or experiential education, but advocated that educators re-examine the philosophical foundation of experiential learning, stating that "we need to move beyond the 'doing' and ensure that...knowledge will be easily remembered, transferred, and applied" (p. 15). Although Knobloch contended that experiential learning was appropriate for the 21st century, he did not give examples of experiential education in action nor suggest ways it could be implemented in the classroom. In a different article advocating new teaching methods to improve agricultural education, Woods (2001) portrayed the experiential
education instructor as an ideal instructor, comparing the position to that of a shepherd caring for sheep. Like Knobloch, Woods failed to give practical implementation suggestions.

Another experiential learning advocate, Miller (1995), saw experiential learning as a way to connect theory and practice. He cautioned, however, that “our duty as educators is to provide experiential opportunities and to make sure they produce learning” (p. 12) through serious reflection.

Other educators saw other ways to produce competent graduates. Torres and Cano (1995) believed that “as teachers, we have the job of preparing students for problems that cannot be foreseen in advance” (p. 8) and advocated teaching higher order thinking (HOT) skills, which encouraged students to synthesize and evaluate concepts and principles. Torres and Cano contended that such thinking skills often were absent in traditional teaching, but could be taught through cooperative learning and by restructuring assignments and tests to challenge students to use these thinking skills. Scanlon (1995), in an article entitled *Can We Afford to do What We’ve Always Done?*, argued that changes needed to be made in agricultural education departments to “(1) become more cost efficient in delivering services, and (2) modify curriculum to serve a more diverse [student] population” (p. 13). He acknowledged that change in the profession had begun but admitted that no one had yet created “a perfect blueprint for the future” (p. 14). Taking a different tone in evaluating some innovative educators’ techniques, Tripp (1993) offered a philosophical critique on what he judged to be misinterpretations of learning theories. He stated that “didactic instruction is still a useful adjunct to experiential learning” (p. 75) in response to educators who advocated immersing students into a situation such as language learning. Tripp argued that “a simulation of the world is not the world” (p. 75), a remark made in reference to videos...
replacing actual experiences. Judging from this collection of studies advocating pedagogical improvements, there seemed to be a consensus that thoughtful changes in the status quo were needed.

**Studies Describing Reforms**

When the literature was searched for case studies describing rather than merely advocating reforms, however, it was discovered that most of the studies describing such improvements took place in elementary schools or high school vocational programs. There was a noticeable dearth of studies documenting actual changes made in college and university classrooms. The researcher was not alone in her observation; Lucas et al (2000) noted that “there are surprisingly few well-documented examples of significant, lasting gains in student learning [as a result of academic reform] at the departmental or institutional level” (p. 72).

Some studies, however, did describe what a few innovative instructors had done to change their old teaching methods in response to the challenge of producing competent graduates. In their 1995 study, Koonz, Peel, Trapp, and Ward explained how an experiential role-playing simulation supplemented and enriched traditional teaching methods in their undergraduate course. Agricultural economics students engaged in a realistic Fed Cattle Market Simulator (FCMS) game, which involved teams role-playing as feed lot managers or packing plant managers. Successful teams learned how to “manage time, delegate responsibilities, and handle personality differences” (Koonz, Peel, Trapp, & Ward, 1995, p. 270), while instructors lauded the game’s ability to strengthen course areas that were weakest in lectures.
In their desire to produce competent graduates, MacKay, Emerson, MacKay, Funnell, & Welsh (1999) designed and implemented a new way to teach horticulture to their undergraduate students. They realized that it was impossible to teach their students all the information needed in their futures and used experiential learning to develop leadership, teamwork, and communication skills in them. In that study, teams of students were allowed to grow profitable floriculture crops by trial and error over two semesters, learning from their own and their classmates’ mistakes and successes throughout the year. In another restructured course, Sornsen, Lunde, Dierberger, and McCallister (1992) created a new agronomy soils course to remedy the shortcomings of the lecture–laboratory–recitation format of the old soils course. The researchers saw that a new way to teach was necessary when they observed that although students performed well enough in the introductory course, they could not apply basic knowledge in an advanced soils course. The restructured soils course was designed to include student responsibility, active learning, cooperative learning, and critical and creative thinking. Although test results measuring student learning were not available at the time the study was published, the instructors felt that the new way the course was taught improved student learning.

Not all studies described changes so drastic as course redesign. Schuch (2001) realized that “traditional lecture style instruction is ineffective in enabling all students to comprehend, assimilate, and apply new knowledge in solving problems” (p. 128) and devised a brief exercise which was incorporated into a horticulture nursery production laboratory session. The exercise used cooperative learning and real plant material found on campus to familiarize students with the American Standard for Nursery Stock (ASNS), a technical guide for growers and buyers of nursery stock. This realistic situation allowed students to
solve problems, work cooperatively, and practice and apply use of the ASNS without extensive course redesign. The aforementioned studies illustrated the benefits of implementing new ways of learning while minimizing the inevitable difficulties encountered by instructors and students as these new courses were introduced.

**Theoretical Framework**

From a previous study, Trexler et al. (2002) concluded that students brought preconceptions of previous educational experiences with them to new educational settings, and these preconceptions seemed to create barriers that affected how and what students learned in the new setting. To further pursue this observation, the following areas were investigated: (1) ways people learned and how they preferred to learn and (2) the formation of conceptions, preconceptions, and the resistance to conceptual change. This study’s theoretical framework was based on these two subject areas. The following section of this study contains summaries of the learning theories of behaviorism, experiential learning, sociocultural learning, and Kolb’s (1984) Learning Preferences theory. Next, information is presented on the formation of conceptions, preconceptions, and the resistance to change.

**Learning Theories**

There exists a great deal of information dealing with the science of learning. Researchers and educational philosophers have argued that there are many ways of learning. Regrettably, no single learning theory has been formulated that can explain every kind of learning; each learning theory was most useful in a specific context. Because “the ideas of behaviorism...provide the bulk of experiences for many [students] in the United States” (Wink & Putney, 2002, p. 9), it was assumed that most of the students in Hort/AgEdS 282, the course that was observed, had gone through traditional school systems where the use of
behaviorism was most common. Therefore, to provide the reader with an understanding of what may have helped create the preconceptions of learning in the Hort/AgEdS 282 students, a brief outline of behaviorism has been included. Experiential and sociocultural learning theories, however, were the dominant learning theories utilized in Hort/AgEdS 282. To give the reader a more complete picture of the theoretical underpinnings of the course, they have been described in greater detail.

**Behaviorism**

This theory postulated that learning was a change in behavior, resulting from the actions of the environment on the learner (Phillips & Soltis, 1998). Behaviorism developed from research on animal learning and dominated psychology for much of the 20th century. In the 1950s and 1960s, educators believed that “curriculum should focus on what the student should be able to do” (Posner, 1995) rather than on content or experiences. Bloom’s *Taxonomy of Educational Objectives* (1956) reinforced the prevailing educational belief that “objectives are expressions of wanted behavior” (Posner, 1995). Although behaviorism provided a straightforward, efficient way to teach by “reward[ing] desirable behavior and extinguish[ing] or punish[ing unwanted] behavior” (Phillips et al., 1998), the theory was not without flaws. Critics of behaviorism cited many weaknesses in the theory. Phillips et al. (1998) noted that (1) there was no mention of the learner’s mental events, (2) there was no account made for prior knowledge, (3) the theory could not explain all learning, such as language acquisition or cognition, and (4) behaviorism assumed that the acquisition of knowledge was a passive process, requiring nothing on the part of the learner. Wink and Putney (2002) criticized the theory of behaviorism because they believed that focusing
merely on a stimulus/response model did not allow "the lived social, cultural, historical, and political context of our lives and those of our students to show through" (p. 10).

**Sociocultural**

Vygotsky (1978) created the theory of sociocultural learning, also called social-cultural, social constructivist, social constructionist, sociocognitive, and socially grounded learning, in Marxist Russia in the early 1900s. When he died in 1934, Vygotsky's work was not well known outside Russia because his work was banned by the Stalin regime and his name was removed from scientific journals. His daughter, who had kept his manuscripts for decades, eventually got them translated and published and re-introduced Vygotsky's work to the world.

Vygotsky used the discipline of psychology combined with his own intuitions (Wink & Putney, 2002) to create a learning theory to adequately explain how people learned in all circumstances. He continually juxtaposed his work on that of his contemporaries such as Taylor, Thorndike, Watson, Skinner, and Pavlov, early behaviorists, and Gagne, Piaget, and Bandura, cognitivists, in order to refine his evolving studies.

Vygotsky contributed several revolutionary ideas to the field of psychology and education, namely that (1) language was a tool for organizing and deepening thought, (2) everything about learning and developing was social, and (3) learning preceded development. The second and third concepts, which had direct implications for education, shall be further explained.

The concept of *social* was instrumental to Vygotsky's work; he saw the notion in two ways. First, to interact with others was social; however, in the Vygotskian sense, to be social also meant to be cultural and historical. Books represented cultural artifacts; number systems
and language were cultural tools. Vygotsky contended that all learning and development, which he defined as "a process in which children grow into the intellectual life of those around them" (Vygotsky, 1978, p. 88), was social, either through interaction with others or through the use of language, a socially constructed tool. Kolb (1984), better known for his theory of experiential learning, concurred with Vygotsky on this point. Kolb believed that each individual's development was shaped by social knowledge held within the cultural system. Wertsch (1991) also agreed with Vygotsky, stating that "even when mental action is carried out by individuals in isolation, it is inherently social in certain respects and it is almost always carried out with the help of tools such as computers, language, or number systems" (p. 15).

Vygotsky believed that development occurred first between people and then within the individual, stating that "learning takes place first on an 'interpersonal plane' through interaction with others, then moves to an 'intrapersonal personal plane' as concepts are internalized by the individual" (Wink & Putney, 2002). In other words, learning began as making meaning with others and then transformed into making sense to the individual. Because learning came from others, it could not take place in isolation; the social and cultural context of an individual influenced his or her development.

Vygotsky believed that individual learning and development could be considerably enhanced through assistance from an adult or a more capable peer. He observed that "what a child can do in cooperation today he can do alone tomorrow" (Vygotsky, 1986, p. 188). He recognized that children could perform far beyond their actual development level "if they were given guidance in the form of prompts or leading questions from someone more advanced" (Wink & Putney, 2002, p. 86). Vygotsky believed that the truest assessment of a
child’s abilities was not what he or she could do by him or herself, but what the child could achieve with help. The difference between the child’s assisted and unassisted performance (Tharp & Gallimore, 1988) Vygotsky called the Zone of Proximal Development, or ZPD. The ZPD identified a child’s potential abilities, which Vygotsky thought were more important than the child’s actual developmental level. The ZPD took into account individual differences between learners and focused on the importance of communication in learning. The ZPD was also crucial in explaining the phenomenon of “performance before competence” (Moll, 1990, p. 3) in which children could perform skills before they were “old enough to be able” (Wink & Putney, 2002, p. 96) to execute them.

Vygotsky’s third revolutionary idea, that learning preceded development, was a direct contradiction with the prevailing opinion of the time, that development preceded learning. Piaget, for example, postulated that a child could only learn something after a certain developmental stage was reached; development was a precondition for learning. Vygotsky believed that learning and development were indeed interconnected, but that development came after learning. Kolb (1984) also agreed with Vygotsky that learning preceded development. Vygotsky (1986) felt that learning came first and led to development and stated, “The only good kind of instruction is that which marches ahead of development and leads it” (p. 188). Vygotsky believed that the educators who followed the learning theories of Piaget, Pavlov, and others “lagged behind students in the process of learning” (Wink & Putney, 2002). Combining the learning-before-development concept with that of the ZPD described earlier, Vygotsky encouraged teachers to teach to students’ proximal levels; that is, to what students were just beginning to understand.
Many educators today believed that the increased demands placed on teachers and students and the demographic makeup of today’s classrooms raised new questions about traditional teaching practices and called for solutions that could improve learning in today’s complex society. For example, the Vygotskian notion of the ZPD could be used to explain the success of such teaching programs such as the Suzuki Method of music instruction, in which very young students were taught to play piano or violin with astonishing skill long before they were considered developmentally ready to play an instrument at all. With the assistance of their parents and teachers, young musicians moved through their own personal ZPDs toward the realization of their potential. Some school teachers saw sociocultural learning as a solution in meeting the demands of modern society and utilized Vygotskian principles in their classrooms. Wells (2000) listed several characteristics of a Vygotskian classroom: (1) constructing a collaborative community; (2) engaging in purposeful activities involving whole persons actively forming identity; (3) incorporating activities that are situated and unique; (4) using curriculum as a means for learning, not just an end result; (5) producing outcomes that are both aimed for and emergent; and (6) constructing activities that allowed diversity and originality (p. 60-61). Such a classroom would have students and teachers working together to generate knowledge through collaboration and exploration in an inquiry-based curriculum (Wink & Putney, 2002). Wink and Putney (2002) advocated teaching through Vygotskian principles because they believed that the work he began decades ago was still relevant today.

“We come from a tradition that often valued individual learning in schools. Yet in life, it is often one’s ability to work with others that leads to success. Classroom teachers...have the power to create a supportive sociocultural environment in which
students are encouraged to mediate their world.... Citizens of the future need...the ability to transfer and transform their knowledge to challenging, unforseen problems and complex realities. They will need to solve problems that do not yet exist; they will need to be able to find workable solutions, both individually and with others” (pp. 121, 156).

Experiential

This theory espouses the idea of learning by doing. John Dewey, arguably the 20th century’s greatest educational philosopher and theorist, believed that students should be given meaningful educational experiences which contributed to real learning rather than mere memorization of facts. An experiential learning curriculum must be viewed in the broadest sense; activities should contribute to students’ personal, intellectual, and social development (Posner, 1995). Due to many misinterpretations of Dewey’s original concept, substandard schools and poorly educated students resulted, and experiential learning fell out of favor after World War II. Dewey’s ideas were rediscovered in the 1960s and formed the basis of alternative schools. Due to several factors, including the “enormous demands [made] on anyone who attempts...practical curriculum decisions” (Posner, 1995, p. 50), experiential learning was relatively uncommon in this country’s current mainstream educational system until the cry for education reform caused some educators to give it a second look.

Experiential learning today has a variety of applications in many different learning sectors (Weil & McGill, 1989), ranging from higher education to social change to personal growth and development. The operationalization of experiential learning ranges widely, because there was more than one way to interpret the meaning of the word “experience.” Kolb (1984) explains:
In experiential learning theory, the transactional relationship between the person and the environment is symbolized in the dual meanings of the term experience — one subjective and personal, referring to the person’s internal state, as in ‘the experience of joy and happiness,’ and the other objective and environmental, as in, ‘He has 20 years of experience on this job’ (p. 35).

From the dual meaning of “experience,” three main traditions of experiential learning were founded. One tradition of experiential learning, training and organizational development, was profoundly influenced by Kurt Lewin (Kolb, 1984). Other important contributors in this area of experiential learning were Carl Jung and Erik Erikson in the field of therapeutic psychology, Carl Rogers in client-centered therapy, Fritz Perl in gestalt therapy, and Abraham Maslow in self-actualization psychology (Kolb, 1984). They also did a great deal of work in the field of adult development, which became a very important application of experiential learning in contemporary educational settings. The tradition of training and development through experiential education also embraced “radical educators” (Kolb, 1984, p. 16), such as Paolo Freire and Ivan Illich, who argued for experiential learning as an agent for social change.

Dewey founded the second tradition of experiential learning in higher education; Piaget founded the third tradition, that of experiential learning in cognitive-development. It was Dewey’s and Piaget’s work stemming from their objective and environmental interpretation of the word experience that most closely matched the interests of this study — higher education and cognitive development. In his field, higher education and experiential learning, John Dewey best summarized the guiding principles of a diverse group of educational philosophers (Kolb, 1984) when he stated that learning transformed concrete
experiences into higher-order purposeful action. Dewey believed that “there is an intimate and necessary relation between the processes of actual experience and education” (Dewey, 1938, p. 20). Dewey was an educational theorist and philosopher who did not offer practical suggestions regarding how his theories should be operationalized, but many of his ideas have been incorporated into traditional educational programs, including apprenticeships, internships, and work/study programs, as ways to meet the challenges of producing a competent graduate.

Piaget agreed with Dewey that learning and experience were intimately related. In his study of cognitive development in children, Piaget believed that intelligence was shaped by experience. In other words, intelligence was not genetically determined; it was the product of the interaction between a person and his or her environment. Cognitive-development processes in childhood were the key, Piaget said, to understanding “the nature of human knowledge itself” (Kolb, 1984). These development processes followed four major stages as a child matured into adulthood. Briefly, they were: (1) the sensorimotor stage, which was characterized by the use of physical activity to construct concepts about how the world worked, (2) the preoperational stage, in which the child could not yet conceptualize abstractly and needed concrete physical situations, (3) the concrete operations stage, in which the child started to conceptualize and solve problems abstractly, and (4) the formal operations stage, where the child began to reason conceptually. Each stage incorporated old experiences into a new, higher level of cognitive functioning (Kolb, 1984).

Kolb (1984), the most frequently cited present day expert of experiential learning theory, (Henry, 1989; McGill & Weil, 1989), defined learning as “the creation of knowledge and meaning, [and] occurs through the active extension and grounding of ideas and
experiences in the external world and through internal reflection about the attributes of these experiences and ideas” (p. 52). He believed that learning was a holistic adaptive process continuously grounded in experience and that “learning was relearning” (p. 28). In other words, the education process did not take place solely in schools, and it not only introduced new ideas, it changed old ones. Kolb observed that learning models proposed by Lewin, Dewey, Piaget, and Freire all described learning as a conflict between opposite ways of dealing with the world, which led him to believe that learning must be achieved through internal confrontation. He theorized that learners needed to choose from polar opposites, or two primary dimensions of the learning process, to be most effective.

The first dimension represents the concrete experiencing of events at one end and abstract conceptualization at the other. The other dimension has active experimentation at one extreme and reflective observation at the other. Thus, in the process of learning, one moves in varying degrees from actor to observer, and from specific involvement to general analytic detachment (Kolb, 1984, p. 31).

The concrete-abstract dimension, depicted on the vertical axis in Figure 1, represented how learners perceived new information. The active-reflective dimension, depicted horizontally, represented how we processed what we perceived. Each dimension presented the individual with a choice; over time he or she developed patterned, characteristic ways of choosing. In addition to explaining how an individual learned, this learning model gave rise to Kolb’s theory of learning preferences, which identified an individual’s preferred method of learning.
Learning Style Preferences

Kolb observed that the learning process was not identical for everyone; if an individual resolved learning conflicts by suppression or dominance of one mode over another, learning tended to be specialized and controlled by the dominant mode. This led to the development of the theory of specific learning styles, which were an adaptive adjustment shaped by a combination of "our heredity equipment, our particular past life experiences, and the demands of our present environment" (Hay/McBer Training Resources Group, 2000, p. 2). Kolb emphatically pointed out that although the subject of "learning styles was complex and not easily reducible into simple typologies....most people develop learning
styles that emphasize some learning abilities over others” (p. 66, 76). The more an individual used and developed certain abilities, the more pronounced his or her learning style became. He described characteristics of the four basic learning styles. Following is a brief summary of his description.

**Convergent**

Convergent learners learned by abstract conceptualization and active experimentation. They were good problem solvers and decision makers, adept at practical application of ideas. They liked a single, correct answer or solution to a problem. They were controlled in their emotional expression, and preferred technical tasks and problems to working with people.

**Divergent**

Divergent thinkers used concrete experience and reflective observation. They possessed imaginative ability and an awareness of meaning and values. They were able to view concrete situations from many perspectives and generated alternative ideas (brainstorming) and solutions to problems. They preferred to observe rather than to take action. They were feeling-oriented and interested in people.

**Assimilative**

People with this learning style used abstract conceptualization and reflective observation. They used inductive reasoning to create theoretical models that were logically sound and precise. They “assimilated disparate observations into an integrated explanation” (Grochow, 1973, as quoted in Kolb, 1984). They were more concerned with ideas than with people. Assimilators were more likely to reexamine the facts if they did not fit the theory; accommodators were more likely to discard the theory if the facts didn’t fit.
Accommodative

Accommodators preferred to use concrete experience and active experimentation. They liked to do things, to carry out plans and tasks. They were opportunity seekers and risk takers. They could immediately adapt to changing circumstances. They solved problems intuitively by trial-and-error; they relied on other people for information rather than on their own analytic ability. Although they were comfortable with people, others sometimes regarded accommodators as impatient or pushy.

Each learning style had its strengths and weaknesses, and no single learning style was best. The most versatile learners, however, were able to competently use each mode when it was called for (Hay/McBer Training Resources Group, 2000).

The concept of learning style preferences has implications for educators. Kolb observed that students entered learning situations with their learning styles already developed despite the fact that learning styles did not generally reflect a fixed way of operating, but rather a current state of mind of operating (Hay/McBer TRG, 2000). Kolb noted that students were “likely to reject or resist” (1984, p. 202) learning environments that operated according to a learning theory that was dissimilar to the learning style of the student. Kolb’s conclusion was consistent with the observations made by Trexler and Davis (2002) – that student preconceptions seemed to create barriers to how and what students learned in a new educational setting.

Conceptions, Preconceptions, and Resistance to Change

A conception is “a way of seeing something; a qualitative relationship between an individual and some phenomenon” (Johansson, Marton, & Svensson, 1985, p. 236).

Johansson et al. (1995) saw learning as “a change from conception (b) to conception (a)” (p.
Piaget’s work on cognitive development in young children offered an explanation of the formation of conceptions. Piaget suggested that children were not born with pre-existing cognitive structures but must construct them as they grew and matured. Children began with only “innate patterns of behavior; like grasping, sucking, and gross body activity” (Richmond, 1970, p. 8), and from this humble beginning, they constructed concepts from interaction with the environment which become organized in the child’s mind into an interrelated network of cognitive structures called schema.

As an individual constructed his or her cognitive structures from experience, an inevitable part of the learning process was the formation of misconceptions, ideas disagreeing with currently accepted knowledge (Camp & Clement, 1994), and preconceptions, knowledge structures or dispositions that an individual had prior to a learning experience. Many preconceptions and misconceptions naturally were challenged and changed as the individual matured, but researchers agreed that conceptions were quite resistant to change (Camp & Clement, 1994; Champagne, Gunstone, & Klopfer, 1985).

Piaget theorized that if changes in schema were necessary, the individual’s mind was in a state of disequilibrium until the changes occurred (see Figure 2), when the individual’s mind returned to the desired state, equilibrium. In describing the process of cognitive change, Piaget proposed that information only slightly different than that held by the individual could be assimilated, requiring no major revisions to his or her schema. Information dramatically different from one’s schema, however, required accommodation: large-scale conceptual changes.
Although assimilation was easier for the individual than accommodation, even minor misconceptions were “extremely resistant to change” (Champagne et al., 1985, p. 163). Champagne et al. (1985) described a study in which middle school physics students’ existing notions of subject matter were identified, and then through a process designed to confront students’ incorrect notions, instructors attempted to change students’ misconceptions. Although data suggested that some changes did occur in the students’ cognitive structures after formal instruction, the authors concluded in part that conceptions derived from experience were more resilient than was initially thought.

Resistance to the process of change was natural, according to Bridges (1980), who postulated that people’s resistance was probably to transition, not change. He described transition as the process of letting go of old ways of thinking and behaving while at the same time learning new ideas and behaviors, which forced the individual to live with ambivalence until the process reached closure. His description of transition corresponded roughly to Piaget’s concepts of accommodation and equilibrium: the brain’s restructuring of knowledge and the temporarily uncomfortable stage when the restructuring occurred.
The phenomenon of conceptual change resistance is of import to education reform. Educational change must occur on two levels: (1) at the organizational level and (2) the level of the individual. Here the relationship between organizational change and individual conceptual change shall be explained. Much attention has been focused on change in the education system advocated at the national level; educators and policy makers agreed that changes were sorely needed. The changes proposed by education commissions and other agencies were directed toward the organizational level, which required a consensus of the policy-makers involved.

Before organizational changes can be implemented, many factors need to be taken into account. In describing some of these factors, Posner (1995) spoke of “frame factors,” which function as both “resources for and constraints on” (p. 181) the process of change. Factors such as physical, temporal, cultural, organizational, and personal considerations can “make or break” attempted changes (Posner, 1995, p. 181). Unanticipated frame factors, such as resistance by individuals involved in the change process, could lead to disappointing or even disastrous results when implementing educational reforms (Posner, 1995).

Educators and policy makers appeared to have focused their attention on frame factors involving individual changes needed by instructors (Dyer & Osbourne, 1996; Newcomb, McCracken, & Warmbrod, 1993), but little attention has been paid to conceptual changes students need to make when education reforms are implemented. Students, who have long been “programmed” or conditioned into the status quo of the educational system and many may be comfortable with the system despite its imperfections, may possess attitudes and preconceptions that could offer resistance to educational reforms. Students’ resistance could become a frame factor affecting educational reforms.
To reduce resistance as educational reforms are implemented, students may be required to make individual conceptual changes. Changes made at the level of the individual require that he or she “mentally manipulate concepts and principles...in the restructuring of knowledge” (Champagne et al, 1995, p. 186). In explaining how conceptual change occurred within individuals, Strike and Posner (1985) proposed four conditions: (1) there must be dissatisfaction with an existing conception, (2) the new conception must be minimally understood, (3) the new conception must appear initially plausible, and (4) the new conception must have the potential to be extended to other situations. As the authors suggested, if educators sought to successfully implement reforms, they needed to create these conditions in students. In other words, if students did not perceive dissatisfaction with an existing condition (they liked the educational system the way it already was), Condition One was not met; the new reform was likely to meet with resistance and the possibility of successful change was reduced.

Students, like everyone else, formed preconceptions of what “should be” based on their previous experience. According to Tuohy (1999), although each school was different, similarities existed in the school culture: the complex whole of “an interlocking system of beliefs, ideas, values, attitudes, meanings, symbols, rituals, and behaviors” (p. 9). Although the school culture gave a sense of security to most students, it also gave students preconceived notions of what all educational experiences should be like. They took these preconceptions, which may be compared to Tuohy’s (1999) concept of perspectives, with them as they entered each new classroom learning situation. According to Tuohy (1999), students’ perspectives “determine what they actually see and pay attention to in the classroom” (p. 33). In other words, a student’s inability to change his or her perspective or
preconception of what "should be" may: (1) adversely affect his or her ability to learn in a new educational setting, and (2) bring about the demise of the new educational experience despite its good intention - to increase student learning. Implications follow that as educators create new exercises, courses, and curricula to produce society-ready graduates, they must be aware of the barriers that students' preconceptions may have as students encounter new learning environments and situations. Awareness of the existence of student preconceptions is the first step toward designing programs that either (1) change preconceptions or (2) not directly oppose them.

Summary

Educational reform has received renewed attention in the last two decades; critics noted that the system of higher education needed to produce competent graduates. A variety of reforms were suggested, including engagement of the university in its community, a multidisciplinary approach, and curriculum changes. Experiential learning was lauded by many university Agricultural Education departments. A few innovative instructors had attempted to improve student learning by incorporating role-playing simulations into their lecture courses, and by using experiential and cooperative learning in previously traditionally-taught courses.

The theoretical framework for this study was based on: (1) experiential learning theory, (2) learning style preferences, and (3) the formation of conceptions, preconceptions, and the resistance to change. The science of learning and learning theories were examined next. Behaviorism, which was most common in traditional school systems, measured learning as changes in student behavior. The theory of sociocultural learning postulated that (1) language was a tool for organizing and deepening thought, (2) everything about learning
and development was social, and (3) learning preceded development. The difference between a child’s assisted and unassisted performance was the ZPD, or the Zone of Proximal Development. Some contemporary educators believed that sociocultural learning was still appropriate in today’s challenging classrooms.

Experiential learning, or learning by doing and reflecting, had many applications in current educational practice: internships, apprenticeships, and work/study programs. Kolb (1984) posited that learning was achieved through internal confrontation and created an experiential learning model that proposed learners chose to perceive information through concrete experience or abstract conceptualization. The learner then processed this information by active experimentation or reflective observation. Because an individual developed preferred ways of choosing how to learn, Kolb theorized that there were four typologies of learning preferences: convergent, divergent, accommodator, and assimilator. The concept of learning styles had implications for educators, who could tailor their teaching methods to the learning styles of their students, thus improving learning and helping to produce a competent graduate.

Finally, research showed that conceptions were resistant to change. Previous school experiences gave students preconceptions about the education experience, which may adversely affect their ability to learn in new educational settings.
CHAPTER III. METHODS

Introduction

Research procedures used in this study were approved by the ISU Institutional Review Board to insure compliance to human subjects research (see Appendix A). The procedures included personal interviews, written open-ended questionnaires, classroom observations, and an on-line learning styles assessment instrument.

This chapter begins with a description of the need for the study. Next, reasons for doing research in the qualitative research paradigm are discussed, followed by descriptions of the study’s setting, population, methods and procedures, and analysis.

Justification

Need for the study

Many educators and institutions agree that education needs to be reformed, and many suggestions for reform have been offered. There have been few cases described, however, which document the actual implementation of possible methods to reform educational practice on a practical level. There may be several reasons why so few case studies have been documented: (1) few have occurred, (2) the types of teachers who employ innovative changes in their classrooms may not be writers, (3) these teachers do not consider their work to be of interest to others, or (4) people have written papers to share their experiences, but their work may not have been deemed valuable by gatekeepers in the research ranks.

Reflection on practice can serve useful purposes in: (1) improving one’s practice and (2) informing others who wish to adopt similar practices. Adopting new methods of teaching is not without drawbacks; student reception of innovative teaching practices and learning environments can affect what he or she ultimately learns. A student’s favorable or
unfavorable reaction to a new situation (in this case, new teaching methods based on experiential and sociocultural learning theories rather than traditional methods) is often based on his or her previous experience; these preconceptions may be a factor in how much or little the student learns in a new situation. This study attempted to: (1) discover undergraduate students’ previous learning experiences based on their preconceptions of university classes and instructors and (2) determine if these preconceptions affected students’ learning in a new educational environment as they engaged in a course based on experiential and sociocultural learning theory. This study has implications for educators who seek to minimize potential problems as they adopt innovative classroom methods that might enhance their students’ learning.

**Methodology choice**

In choosing the methodology for my research, I had to understand that “what works depends on the kind of work one wants inquiry to do” (Smith and Heshusius, 1986, p. 10). In this case, I wanted my inquiry to answer two questions:

1. How did students’ previous learning environments affect learning in an experientially-based classroom?

2. Did students’ individual learning styles affect their adaptation to an experientially- and socioculturally-based undergraduate class?

This inquiry could not be addressed in the quantitative paradigm. Rather, qualitative methodology, broadly defined by Taylor and Bogdan (1998) as one which “produces descriptive data” (p. 7) through in-depth, open-ended interviews, direct observation, and written documents (Patton, 1990), offered data-gathering techniques more suitable for the questions that guided this research.
The primary limitation of qualitative inquiry is that research results cannot be
generalized to a larger population. This study was designed to shed insight on how student
preconceptions affect learning in a specific educational context.

The measure of truth or validity in the qualitative paradigm is that of agreement –
“matching descriptions to other descriptions, choosing to honor some because they ‘make
sense’” (Smith and Heshusius, 1986, p. 9). This study established validity, credibility,
dependability, and confirmability, all important factors in establishing the truth value,
applicability, consistency, and neutrality of qualitative research (Erlandson, Harris, Skipper
& Allen, 1993). Credibility was obtained through prolonged engagement with research
subjects; the researcher was present and recorded observations at every class session
throughout the semester. Dependability was achieved with audio-taped conversations and
written notes. Excerpts from raw data included in the study and the audit trail both provided
confirmability.

Kolb’s Learning Styles Inventory, as scored by an independent researcher, showed
very good internal consistency and test-re-test reliability. Validity of the LSI was established
through numerous studies; in a review of the literature in 1992, Hickox reportedly concluded
that “83.3 percent of the studies provided support for validity” (Hay/McBer TRG, 2000, p. 70).

Setting

At a Midwest land-grant university, I observed the students and co-instructors in the
Hort/AgEds 282 course, a semester-long class that was taught for the first time the previous
year. The course was funded through a United States Department of Agriculture (USDA)
Higher Education Challenge Grant. The course combined the disciplines of horticulture and
agricultural education. The course served as a context for undergraduates to develop interpersonal skills as they created educational exhibits and lessons for youth, which integrated horticultural and agricultural education knowledge. While meeting local university needs, the course was designed as an innovative model for meeting needs defined as fundamental by the National Research Council’s Board on Agriculture (1996).

The Hort/AgEdS 282 curriculum was structured around experiential and sociocultural learning theories. Instructors infused experiential learning theory into the course by providing educational experiences and then asking students to reflect on what they had gained from the experiences. Experiential learning activities included field trips, the opportunity to plan and conduct educational tours for local children, hands-on horticulture activities, and opportunities for individual reflection. Instructors incorporated sociocultural learning theory into the curriculum as well, altering the social climate of the classroom to facilitate social or cooperative learning. Sociocultural learning took place as students worked in groups to complete projects and assignments such as garden designs, plant lists and budgets, lesson plans, and an elementary student conservatory tour.

The three-credit course met four hours on Mondays and one hour on Wednesdays for the entire semester. The course had two instructors from two departments, one from Horticulture and one from Agricultural Education. The class usually met in a traditional classroom containing movable desks with writing surfaces attached to each, a chalkboard, overhead and slide projectors, and a portable computer system. When deemed appropriate, the class was held in a computer lab or moved to the horticulture greenhouse lab for hands-on lessons in horticulture. Students also utilized the horticulture department’s conservatory
when they conducted tours there for local third graders. Other class sessions were held at the university's public garden, an art museum, and a botanical garden.

**Population**

The population for the study was the students enrolled in Hort/AgEdS 282. Of the 25 students in the class, eight students volunteered to take part in the study. Of the eight volunteers, four were males and four were females. Two of the students were sophomores, four were juniors, and two were seniors. Students represented three departments: one student was an Elementary Education major, three were Agricultural Education majors, and four were Horticulture majors. One student was an adult student in her mid forties; all others were traditional aged students in their early twenties. All students were Caucasian.

**Methods and Procedures**

To reach the study's objectives, the researcher employed four research methods: (1) classroom ethnography, (2) written questionnaire, (3) personal interviews, and (4) Kolb's Learning Style Inventory. By utilizing the information obtained from the classroom ethnography and the questionnaires, the researcher was able to ask more informed questions during the personal interviews, gaining a more complete understanding of students' preconceptions and how they affected student learning. To ascertain students' learning styles, an on-line assessment of individual learning style based on Kolb's (1984) experiential learning theory was used.

**Ethnography**

Classroom ethnography was adapted from the work of anthropologists (such as Margaret Mead), who used it as a way of learning about human cultures (Ary, Jacobs, and Razavieh, 1996). Fetterman (1998) expanded upon the concepts of Ary et al. (1996) when he
stated that ethnographic studies detect predictable patterns of human thought and behavior through direct observation. Hammersly (1990) used direct observation as he engaged in classroom ethnographic research to "understand the social processes involved in classroom interaction" (p. vii). Ary et al. (1996) explained that ethnographic data may be gathered through *participant observation*, in which the researcher became a part of the group under study, or through *nonparticipant observation*, in which the researcher observes but does not engage in activities of the group. In this study, the researcher became a participant observer whose role as observer was known to the students in the class – a common practice in participant observation. The researcher daily recorded field notes (or observations) during each class session to create an ethnographic record of the course. Conversations, lectures, and behaviors of students and instructors were observed and documented, which allowed the researcher to identify and note any unusual or interesting behavior or critical incidents that could be followed up with further questions after class.

**Written questionnaire**

A written questionnaire (see Appendix D) was employed to voluntarily procure information from all students in the course in addition to the eight students personally interviewed. Questions were germane to the instruction methods and classroom environment and were based on Brookfield’s (1995) work on critically reflective teaching. The questionnaire was reviewed by the researcher’s major professor before it was administered to students. The information obtained from the questionnaire supplemented the daily field notes to give additional insight that allowed the researcher to ask more informed questions during personal interviews.
Personal interviews

A general interview guide regarding students' preconceptions of college classes and teachers (see Appendix C) was prepared to ensure that the same information was obtained from all interviewees (Patton, 1990). Besides making the interview process more systematic, the interview guide approach allowed the researcher to use the interview time more efficiently. Questions on the general interview guide were devised to elicit information that might support or refute findings from the previous Trexler & Davis (2002) study which concluded that students' preconceptions of college classes presented barriers to optimum learning. Interview questions were reviewed by the researcher's major professor and the Human Subjects Review Board before being asked of students. Eight volunteer students from the class were interviewed upon three occasions: first, at the beginning of the semester, second, about midway through the semester, and finally, during the last week of class. All interviews were audio taped and transcribed, serving as primary data sources. The first and third interviews lasted approximately 45 minutes each. The second round of interviews was somewhat shorter, usually lasting less than 30 minutes each. Only one student missed the final interview; all other students completed the entire set of interviews.

Learning Styles Inventory

An on-line version of Kolb's Learning Styles Inventory was administered to the eight volunteer students and their fellow classmates as part of the class's activities. The Learning Styles Inventory was taken by all students simultaneously in the computer lab, and individual results were available to each student immediately upon completion of the inventory. Copies of each student's test results were also e-mailed to the researcher that same day.
Analysis

Prior to data collection and analysis, the researcher identified her own biases regarding college and university classroom experiences and teachers, following the advice of Taylor and Bogdan (1998), who believed that “it is better to own up to your perspective... rather than to act as thought you have no point of view” (p. 161).

Because students’ preconceptions of the educational system were assumed to have been influenced by their past educational experiences, students’ current preconceptions were used to ascertain what sorts of learning environments the eight volunteers had previously encountered. The analysis of students’ preconceptions began by creating case records (Patton, 1990) of each informant constructed from information gained during personal interviews and daily classroom field notes. To create case records, data were searched for “vocabulary, conversation topics, recurring activities, meanings, and feelings” (Taylor & Bogdan, 1998) and organized topically (Patton, 1990) to determine each student’s preconceived notions of college classroom experiences and teachers. Students’ preconceptions were then used to identify their past educational environments. The eight case records were compiled to create a case study.

Summary

This study was needed to inform other innovative educators as they adopted new classroom methods. Qualitative research methods were employed to discover students’ previous learning environments and to determine if the resulting preconceptions affected students’ learning. Although the class met in a conventional college classroom, other locations were utilized as deemed necessary by the instructors. The population was the 25 students who completed the course. Eight students from the course volunteered for in-depth,
personal interviews. Research methods employed for the study were: (1) a classroom ethnography, (2) a written questionnaire, (3) personal interviews, and (4) an on-line version of Kolb’s Learning Styles Inventory (LSI). Data analysis to determine student preconceptions was done by creating case records of eight students taking the course and developing a case study from the case records.
CHAPTER IV. HOW UNDERGRADUATES’ PREVIOUS EDUCATIONAL EXPERIENCES INFLUENCED THEIR REACTIONS TO EXPERIENTIAL LEARNING IN A HORTICULTURE COURSE

A paper to be submitted to NACTA
Lynnette Davis and Cary J. Trexler

Abstract

Despite the many calls for educational reform over the last decade, relatively few changes appear to have been made in higher education. The purpose of this qualitative study was to determine how students’ previous educational experiences might have affected their reception to and learning in an experientially-based learning environment. Based on conceptual change and learning theory, the underlying assumption was that students’ previous learning environments may have influenced the creation of preconceptions that affected student reactions to a novel learning environment in an experimental course. Students may require an adjustment period to new educational environments. Students’ positive reactions to an experientially-based course in Agricultural Education and Horticulture appeared to be linked to their previous educational experiences that did not require them to construct new conceptions about the nature of teaching and learning. Links could not be established between how much students believed they learned and their previous educational experiences, but there appeared to be a link between how much students believed they learned and the type of knowledge gained. This study has implications for conscientious administrators, curriculum developers, and instructors who contemplate restructuring courses to maximize student learning.

Introduction

Undergraduate professional education, like education in the United States in general, has come under close scrutiny in recent years (Kunkel, 1992). The Boyer Commission (1996) described learning at the nation’s research universities in stark terms: many students routinely graduate without knowing how to think logically, write clearly, and speak coherently. Legislators, parents, students, government, accrediting bodies, industry, and business have all demanded that universities and colleges produce competent graduates (Eddy, Murphy, Spaulding, & Chandras, 1998).
Despite the many calls for educational reform over the last decade, a review of the literature revealed relatively few case studies of improvements to the dominant pedagogy of undergraduate teaching in higher education. Lucas and Associates (2000) observed that "many recent efforts at academic reform, though well-intentioned, have resulted in relatively little lasting improvement" (p. 74).

Sims & Sims (1995) have suggested one reason for the lack of literature describing improvements was that colleges and universities were "satisfied with the results that are being obtained from the traditional pedagogy approach to education ... and tend to resist change" (p. 150). Another reason why so few educators have tried new ways to improve teaching and learning may have been that they did not know how to go about it; change was and is a daunting task and demands that many factors be taken into account. Frame factors are factors that surround the implementation of change and function as both "resources for and constraints on" (Posner, 1995, p. 181) the process of change. Frame factors such as physical, temporal, cultural, organizational, and personal considerations can influence attempted changes. Posner has suggested unanticipated frame factors may lead to disappointing or even disastrous results when implementing educational reforms.

Students, whose attitudes and preconceptions may offer resistance to educational reforms, have long been "programmed" or conditioned into the status quo of the educational system and many may be comfortable with the system despite its imperfections. According to Marshall (1991), "one cannot expect a system with entrenched values [and] standard operating procedures" (pp. 4-5) to accept change without reservation. Many students, as a result of having learned these entrenched values and standard operating procedures, traveled through the education system and created preconceptions of what the educational system
should be like. In a previous study, Trexler & Davis (2002) concluded that in a novel learning environment, students’ preconceptions of what an educational experience “should be” created a frame factor that functioned as a constraint to student learning; if students encountered a learning environment that did not match his or her preconceptions, learning appeared to have been reduced.

**Theoretical Framework**

The underlying assumptions for this study were that: (1) students’ previous learning environments were frame factors that may have affected the creation of preconceptions which influenced students’ reactions to novel learning environments, and (2) adverse reactions could diminish learning. This study was designed to further explore the Trexler & Davis (2002) conclusion and was theoretically based on the formation of conceptions, preconceptions, and the resistance to conceptual change.

Piaget’s work on cognitive development in young children offered an explanation of the formation of conceptions, preconceptions, and misconceptions (Richmond, 1970). He suggested that children constructed concepts from interactions with the environment. An inevitable part of the learning process was the formation of misconceptions, ideas that disagreed with currently accepted knowledge (Camp & Clement, 1994) and preconceptions, knowledge structures or dispositions that an individual formed prior to a learning experience. Many preconceptions and misconceptions naturally were challenged and changed as the individual matured, but researchers agreed that once conceptions were formed, they were often quite robust (Camp & Clement, 1994; Champagne, Gunstone, & Klopfer, 1985)

The phenomenon of conceptual change resistance is of import to education reform. Educational reform or change occurs at two levels: (1) the organizational level and (2) the
individual level. Much attention has focused on change in the education system advocated at the national or organizational level. Personal conceptual change, however, differs from organizational change in that it involves changes made within an individual. Individual change requires that the person "mentally manipulate concepts and principles...in the restructuring of knowledge" (Champagne et al., 1995, p. 186). In explaining how conceptual change occurred within individuals, Strike and Posner (1985) proposed four conditions: (1) there must be dissatisfaction with an existing conception, (2) the new conception must be minimally understood, (3) the new conception must appear initially plausible, and (4) the new conception must have the potential to be extended to other situations (Strike & Posner, 1985).

Students, like everyone else, form preconceptions of what "should be" based on their previous experiences. Although schools differed, Tuohy (1999) has argued a number of cultural similarities existed. Along with imparting a sense of security, school culture also instilled in students preconceived notions of what all educational experiences should be like. These preconceptions "determine what they [students] actually see and pay attention to in the classroom" (Tuohy, 1999, p. 33). In other words, if students encountered novel learning environments or experiences, their tightly held preconceptions may have prevented them from taking full advantage of learning opportunities in the new learning environment.

Although school cultures shared many similarities, individual professors, departments, and schools have created different learning environments based on what they believed students should learn (curriculum) and how they should learn it (teaching methods). Posner (1995) proposed that five different theoretical perspectives of curricula: (1) traditional; (2) behavioral; (3) experiential; (4) structure of the disciplines, or structure for
short; and (5) cognitive, influenced the learning environments for most students in this country. He observed that most students experienced a combination of learning environments, but the combination of traditional and behavioral learning environments were probably most commonly used in schools (Posner, 1995).

Specifically, this study sought to discover if students’ preconceptions affected their learning in an experientially-based course. This study’s conceptual model emphasized the need to be aware of students’ preconceptions when implementing change: when teaching a course in a new way, for example. Change within a system, such as a new learning environment, often leads to discomfort in individuals as familiar environments are replaced (Marris, 1974). Adaptation to change is easier for some students than others (Ferrell, 1988); those students who have difficulty in adapting may continue to feel discomfort in their new learning environment. Discomfort, if too pronounced, has been shown to lead to impaired learning and performance (Goldstein, 1999; Schell & Black, 1997; Terry, 2000).

This study’s conceptual change theoretical framework was operationalized through classroom observation and by conducting interviews with students to determine their preconceptions of the educational system, their reactions to an experientially-based course, and perceptions of their own learning. Their preconceptions and reactions to classroom activities offered insight into students’ previous learning environments; these learning environments were categorized according to Posner’s (1995) theoretical perspectives on curriculum.
Purpose and Objectives

The purpose of this study was to determine how students' preconceptions of learning in a university setting affected their reaction to and learning in an experientially-based learning environment.

The objectives of this study were:

1. To identify students' previous learning environments by examining students' preconceptions of the educational system.
2. To discover students' reaction to the experientially-based course.
3. To discover how much students believed they learned in the experientially-based course.
4. To determine if there was a connection between students' previous learning environments and their reaction to the course.
5. Compare students' previous learning environments with how much they believed they learned in the course.
6. Compare students' reaction to the course with how much they believed the learned in the course.

Methodology

This study could not be addressed in the quantitative paradigm. Rather, qualitative methodology, broadly defined by Taylor and Bogdan (1998) as one which "produces descriptive data" (p. 7) through in-depth, open-ended interviews, direct observation, and written documents (Patton, 1990), offered data-gathering techniques more suitable for this research.
There are several limitations to studies of this nature. First, the results cannot be
generalized to other populations. Here the reader must “test the fit” or make his or her own
determination of the transferability to similar situations. Second, because the researcher was
the data-gathering instrument (Ary, Jacobs, & Razveigh, 1995), biases and personal
experiences influenced the interpretation of data. Realizing this, the ethnographer tried to
“bracket” (Taylor & Bogdan, 1998) her biases by explicitly stating them prior to analysis of
field notes. As with all ethnographic studies, “there is no single interpretive truth” (Denzin
& Lincoln, 2000, p. 34). Third, because the study’s participants were volunteers, different
results might have been obtained if an alternate method was used in selecting students for
interviews.

The researcher sought to establish validity, credibility, dependability, and
confirmability, all important factors in establishing the truth value, applicability, consistency,
and neutrality of qualitative research (Erlandson, Harris, Skipper, & Allen, 1993).
Credibility was obtained through prolonged engagement with research subjects; the
researcher was present and recorded observations at every class session. Validity was
established through triangulation; multiple sources of data were used. Dependability was
achieved with audio-taped conversations and written notes. Excerpts from raw data and the
audit trail both provided confirmability.

Setting

At a Midwest land-grant university, the students and co-instructors were observed in
the Hort/AgEdS 282, *Teaching Youth through Horticulture*. This semester-long class,
funded in part through a USDA Higher Education Challenge Grant, was taught for the first
time the previous year. The course combined the disciplines of horticulture and agricultural
education and allowed undergraduates to develop interpersonal skills as they created curriculum materials and garden exhibits for youth. The three-credit course met four hours on Mondays and one hour on Wednesdays for the entire semester. The course had two instructors from two departments: Horticulture and Agricultural Education.

The Hort/AgEdS 282 curriculum was structured around experiential and sociocultural learning theories. Experiential learning, espoused by John Dewey (1938) and later expanded upon by David Kolb (1984), involved learning by doing, or actually engaging in an activity, and then formally reflecting, or thinking about what was gained as a result of the experience. Dewey (1938) contended that “there is an intimate and necessary relation between…actual experience and education” (p. 7). As Dewey saw it, the responsibility of the experiential educator was to provide experiences that would produce learning or growth that is “educative,” or useful. Hort/AgEdS 282 instructors infused experiential learning theory into the learning process by engaging students in educational experiences and then asking them to reflect on different aspects of the experiences, depending on the goal of the activity. Experiential learning activities included field trips, the opportunity to plan and conduct educational tours for local children, hands-on horticulture activities, and opportunities for individual reflection.

Population

The study’s population was the 25 students enrolled in Hort/AgEdS 282. Eight students from the course volunteered to participate in the study. Four of the participants were males and four were females. Although 200-level courses traditionally target enrollment from college sophomores, only one of the students actually was a sophomore; four were juniors, and three were seniors. Students came from three departments: three students from
Agricultural Education, four from Horticulture, and one from Elementary Education. All but one of the eight students were traditional college-aged students; one was an adult student (over age 25). All students were European American or Caucasian.

**Procedures**

Classroom research, the “careful, systematic, and patient study of students in the process of learning” (Cross, 1990, p. 2), was employed to reach the study’s objectives. To reach the study’s first objective, to discover students’ previous learning environments through their preconceptions of the educational system prior to taking Hort/AgEdS 282, the researcher employed three research methods: (1) classroom ethnography, (2) written questionnaire, and (3) personal interviews. A brief description of each research method is included next, followed by an outline of procedures used in data analysis.

**Ethnography**

Classroom ethnography was adapted from the work of anthropologists (such as Margaret Mead), who used it as a way of learning about human cultures (Ary, Jacobs, and Razavi, 1996). Fetterman (1998) stated that ethnographic studies detected predictable patterns of human thought and behavior through direct observation. Hammersly (1990) used direct observation as he engaged in classroom ethnographic research to “understand the social processes involved in classroom interaction” (p. vii). The researcher recorded field notes (or observations) during each class session to create an ethnographic record of the course. Conversations, lectures, and behaviors of students and instructors were observed and documented, which allowed the researcher to identify and note any unusual or interesting behavior or critical incidents that could be followed up with further questions after class.
Written questionnaire

A written questionnaire (see Appendix D) was employed to voluntarily procure additional information from all students in the course. Questions were germane to the instruction methods and classroom environment and were based on Brookfield's (1995) work on critically reflective teaching. The information obtained from the questionnaire supplemented the daily field notes and allowed the researcher to ask more informed questions during personal interviews.

Personal interviews

A general interview guide regarding students' preconceptions of college classes and teachers was prepared to ensure that the same information was obtained from all interviewees (Patton, 1990). The eight volunteer students were interviewed on three occasions: first, at the beginning of the semester, second, about midway through the semester, and finally, during the last week of class. All interviews were audio taped and transcribed, serving as primary data sources. The first and third interviews lasted approximately 45 minutes each. The second round was somewhat shorter and usually lasted less than 30 minutes each. One student missed the final interview; all other students completed the entire series.

Data Analysis

Because students' preconceptions of the educational system were assumed to have been influenced by their past educational experiences, their current preconceptions were used to ascertain what sorts of learning environments the eight volunteer students had previously encountered. The analysis of students' preconceptions to determine their previous educational experiences began by creating case records (Patton, 1990) of each informant constructed from the information gained during personal interviews and daily classroom field
notes. To create case records, data were searched for “vocabulary, conversation topics, recurring activities, meanings, and feelings” (Taylor & Bogdan, 1998) and organized topically (Patton, 1990) to determine each student’s preconceptions and probable previous learning environments. Previous learning environments for each student were coded according to Posner’s (1995) five theoretical perspectives of curriculum. A brief summary of each learning environment along with its coding symbol is presented in Table 1.

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning Environment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Traditional</td>
<td>Purpose: transmit cultural heritage. Focus: content. Students passive; teachers authoritarians – get students to think. Lecture/recitation format common.</td>
</tr>
<tr>
<td>E</td>
<td>Experiential</td>
<td>Purpose: development of student. Student has some control over what he/she learns. Organized around situations that influenced students’ lives. Teachers: facilitators, guides.</td>
</tr>
<tr>
<td>C</td>
<td>Cognitive</td>
<td>Purpose: development of the mind by linking new information to old. Constructivism: learners construct their own understanding of subject matter.</td>
</tr>
</tbody>
</table>

Findings/Results

Findings based on interviews and ethnographic field notes are presented below. They are organized by research objectives.
Research Objective 1: to identify students’ previous learning environments from their preconceptions.

Students were coded (T, B, E, S, or C) according to Table 1. Because students’ previous educational experiences came from a mix of the five learning environments, more than one coding is listed for each student. Following is a description of students’ codings.

Table 2. Students’ Previous Learning Environments

<table>
<thead>
<tr>
<th>Student</th>
<th>Previous Learning Environment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>T, B, E</td>
</tr>
<tr>
<td>Mark</td>
<td>T, B, E</td>
</tr>
<tr>
<td>Mary</td>
<td>T, B</td>
</tr>
<tr>
<td>Mindy</td>
<td>T, B, E, C</td>
</tr>
<tr>
<td>Sally</td>
<td>T, B</td>
</tr>
<tr>
<td>Shelley</td>
<td>T, B, E</td>
</tr>
<tr>
<td>Sean</td>
<td>T, B</td>
</tr>
<tr>
<td>Rich</td>
<td>T, B, E</td>
</tr>
</tbody>
</table>

*Coding abbreviations: T = Traditional, B = Behavioral, E = Experiential, C = Cognitive, S = Structure of the Disciplines.

Chuck was well acquainted with Traditional (T) learning environments; he commented that he did “pretty well with the lecture format” and liked it because when instructors lectured, “you know that that’s what you have to know...it’s pretty straightforward” (interview, 1/28/02). Chuck thought small university classes were “weird” because he was “adjusted to the 200-people [lectures]” (interview, 1/28/02). In addition to his Traditional background, Chuck exhibited his Behavioral (B) background. He saw course requirements in terms of expected behaviors. When he was asked if he had met his responsibilities as a learner in Hort/AgEdS 282, Chuck replied, “If that means doing everything [that was required], yeah” (interview, 5/02/02). He saw Experiential (E) learning environments as being outside of formal schooling, but he recognized their value in helping people learn. “Experience....You can sit in horticulture and all these education classes and
they can tell you all this crap about what methods are going to work best, but you’re not going to know anything until you actually get out there and do it” (interview, 1/28/02).

Mark was familiar with the Traditional (T) learning environment that used lecture to deliver content. He described a lecture as “somebody standing in front of the room preaching at you....giving you facts....and they expect you to know it” (interview, 2/1/02). He believed it was the teacher’s job to “really get you to think about [what you are learning]” (interview, 2/1/02), a remark consistent with the Traditional view. Mark had also been in a Behavioral (B) learning environment; he believed that in high school, “you have to do [things] exactly the way the teacher wants it” (interview, 2/1/02). In other words, Mark thought teachers were looking for certain behaviors; if “you don’t do [that], you’re going to fail” (interview, 2/1/02). Mark had also been in an Experiential (E) learning environment. He described a favorite draft horse management course: “It was really hands-on. You’re working with the animals, right there in the barn....You were the one who was responsible for these two horses. You had to train them, break them, drive them, everything” (interview, 2/1/02).

Mary, an adult student, had home-schooled her own children because she believed that the educational system placed too much emphasis on content (a Traditional (T) view) and not enough on creativity. Mary had certainly experienced a Traditional learning environment in her past; she chafed at the power structure inherent in the Traditionalist learning environment where the teacher was the authority. “It’s like, ‘You’re the student, and it doesn’t matter if you’re comfortable or not!’ ...There was no choice.” (interview, 3/24/02). Mary lamented that even when instructors tried to get away from lectures, they often could not, because “we had to cover [certain content] today” (interview, 3/24/02). Mary revealed her Behavioral (B) background when she confessed that she was
uncomfortable when she didn’t know “what they [teachers] wanted” (4/28/02) when completing an assignment. She admitted that she “like[d] classes where I know what’s expected, and I can do it and be done” (interview, 3/24/02).

Mindy, the elementary education major, described the Traditional (T) learning environment in which she grew up and compared it to the new information she had learned in her education classes.

We talk about that a lot in elementary education – to be a facilitator for the students and for the classroom to be more student-directed….We also talked about how that makes our generation uncomfortable because we’re not used to that. We’re used to being taught (interview, 1/28/02).

Mindy revealed her Behavioral (B) background when she remarked that her teachers were “looking for the right answers” (interview, 3/23/02), or, in other words, certain behaviors on the part of the student. As evidenced by her comments about her education courses, Mindy had also had exposure to Experiential (E) and Cognitive (C) learning environments. Mindy said her education classes “always [had] a lot of hands-on activities and discussion” (interview, 1/28/02), features that were characteristic of these learning environments. Mindy demonstrated her understanding of Experiential learning when she divulged that throughout the semester she had observed her fellow Hort/AgEdS 282 class members and “saw a lot of students frustrated [because] it was experiential learning, not lecture. I wasn’t expecting that – in my education classes, [experiential learning] is common” (interview, 4/29/02).

Like the other eight students, Sally was familiar with the Traditional (T) lecture method of delivering content; she commented that “[instructors] will be dictating all the information….notes are pretty explicit that instructors give to you” (interview, 1/28/02).
Sally found lectures to be pretty dull; she described them as “where you usually fall asleep unless you drink enough coffee before you go” (interview, 1/28/02). Sally questioned the authoritarian methods of the Traditional learning environment. She revealed that she agreed with her father, who was “one of those people who isn’t going to do something just because you told him to do it” (interview, 3/23/02). Sally believed that a student learned if he or she went through “the process and [got] to an end result, even though it may not be the end result that is written in the syllabus” (interview, 3/23/02). Sally had also experienced a Behavioral (B) learning environment, but she disliked it immensely as well. She did not enjoy her English or literature classes because “they expect you to have so many note cards and so many things handed in before the actual paper is due, because they want to make sure you’re on the right track and you’re getting there and you’re progressing” (interview, 1/28/02). Sally agreed with Matt and Mary that students were expected to give teachers “what they [the teachers] wanted” (interview, 3/23/02).

Sean’s Traditional (T) definition of a lecture was typical of the responses of the rest of the students. He said a lecture was “one teacher standing up in front of a class…giving out information….Either a Power Point or slide overheads, and you have to copy it down as fast as you can. Basically, that’s what I’m used to” (interview, 1/25/02). Sean perceived a typical lab as a classic Behavioral (B) learning environment. “You start at the beginning of class, and you work through it [the lab book] in the time you’re there. There are certain things you have to do, certain little projects….You fill out the information” (interview, 1/25/02).

Shelley believed her Traditional (T) background, a Catholic college prep school “where they [gave] you hard courses…and a lot of homework” (interview, 1/30/02), prepared
her admirably for the rigors of college. She believed that teachers had to have “an authoritative background...so [they could] tell you exactly what you need to be learning” (interview, 1/30/02). Shelley exposed her Behavioral (B) background when she commented that she was more comfortable when “due dates and stuff like that” (interview, 3/23/02) were clearly spelled out; in other words, exactly when certain behaviors were expected. Although all eight students had had at least one lab course in his or her educational past, Shelley was one of only two respondents who recognized some of her labs as Experiential (E) learning environments. In fact, labs were Shelley’s preferred way of learning. “I tend to learn better from hands-on than reading out of a book. [Labs] really help me” (interview, 1/30/02).

Rich illustrated his previous Traditional (T) learning experiences with his remarks about having to learn so much content. “I correlate...lectures with the textbooks that are four inches thick that I’m supposed to read” (interview, 1/30/02). Rich revealed his Behavioral (B) background when he remarked that “you have to prove to your teachers that you are putting in effort” (interview, 1/30/02). He believed that “if you show up and do the work, you’ll do fine” (interview, 4/29/02). Rich, like Shelley, recognized that labs provided Experiential (E) learning environments, and preferred learning in such environments. “I’m a hands-on kind of person, so...I like labs....It gives you a break from your lecture classes ...[and] increases your understanding of lecture material” (interview, 1/30/02).

**Research Objective 2:** to discover students’ reaction to Hort/AgEdS 282.

Results of students’ reactions to the course are listed in Table 3. When asked what he thought of the course, Chuck admitted, “At first it was a little culture shock....[but] I’m adjusting....For the most part, I like it. I don’t mind it at all” (interview, 3/23/02). Despite
the fact that he thought Hort/AgEdS 282 was “different” (interview, 3/23/02), Chuck said, “It works” (interview, 5/02/02). He had a positive reaction to the course.

Table 3. Students’ Reactions to the Course.

<table>
<thead>
<tr>
<th>Student</th>
<th>Reaction to 282</th>
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<tbody>
<tr>
<td>Chuck</td>
<td>positive</td>
</tr>
<tr>
<td>Mark</td>
<td>positive</td>
</tr>
<tr>
<td>Mary</td>
<td>negative</td>
</tr>
<tr>
<td>Mindy</td>
<td>positive</td>
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<tr>
<td>Sally</td>
<td>positive</td>
</tr>
<tr>
<td>Shelley</td>
<td>positive</td>
</tr>
<tr>
<td>Sean</td>
<td>negative</td>
</tr>
<tr>
<td>Rich</td>
<td>positive</td>
</tr>
</tbody>
</table>

Mark enjoyed the course a great deal and saw its utility for his intended career as an agricultural education teacher. He was pleased with the depth of instruction of “learning styles and stuff” (interview, 3/30/02). He “like[d] the variation in what we [the class] are doing…it’s all mingled together, and I like that” (interview, 3/30/02). Mark wished for “an upper level 282 next year” (interview, 4/29/02); he wanted to continue what he had started learning in the course. Mark had very positive reaction to the course.

Mary disliked the course intensely and was “relieved” (interview, 4/28/02) when it was over. She called the course “repulsive” because it “went against the grain” (interview, 4/28/02) of her personal philosophy of education. She only completed the course “because it was part of the Public Gardens Option” (interview, 4/28/02), a graduation requirement. She commented that “I have to do what I have to do” (interview, 4/28/02). Mary had a negative reaction to the course.

Mindy thought Hort/AgEdS 282 was “pretty comparable to some of my education classes” (interview, 3/23/02). She said she would recommend the class to others because it was “important….to know how kids learn” (interview, 4/29/02). She appreciated the fact
that although she had learned some of the information in other courses, in Hort/AgEdS 282, she got to “apply it [what she learned] more” (interview, 3/23/02). Mindy had a basically positive reaction to Hort/AgEdS 282.

Sally recounted a conversation with her roommate in which she described Hort/AgEdS 282. “I told her, ‘[Hort]AgEd 282 was this wonderful class and we do all these different things’” (interview, 3/23/02). She liked the fact that the course took “a different approach” and called it “a refreshing surprise” (interview, 3/23/02). Sally had a positive reaction to the course.

Sean was a bit hesitant to express his opinion about the course. He carefully stated, “I think it’s going okay. Sometimes it’s a little hectic not knowing exactly what we’re going to be doing in terms of group work....and projects” (interview, 3/23/02). During class time, especially lab sessions, Sean seemed tense and harried, and he did not appear to enjoy the activities as much as his classmates (field notes, 2/10/02, 4/8/02). He diplomatically commented that “if you had your whole course load like this, it would be a little chaotic” (interview, 3/23/02). Sean had a generally negative reaction to the course.

Shelley admitted that she had to make an initial adjustment to the course but stated, ‘I’m getting comfortable with it” (interview, 3/23/02). She liked “the idea of working in smaller groups instead of doing everything either individually or everything as a big class” (interview, 3/23/02). Shelley explained that she liked the course because it was good for her as a horticulture student; she “got a lot out of the...education section” (5/1/02). Shelley had a positive reaction to the course.

Even though he had some complaints about assignments, Rich stated, “I like the class....It’s all hands-on. That’s really what does it for me” (interview, 3/25/02). In a later
interview, though, when asked if he liked the course, he said, “Yes and no. It all revolves around my grade....If I don’t get an A, I won’t say I don’t like the class, but I’ll be disappointed” (interview, 4/29/02). Rich admitted, however, that he “did learn stuff” (interview, 4/29/02), especially from the field trips. “I really enjoyed those,” he said. “I got a lot out of them” (interview, 3/25/02). Basically, Rich had a positive reaction to the course.

**Research Objective 3:** to discover how much students believed they learned in Hort/AgEdS 282.

Students were asked to rate Hort/AgEdS 282 for the amount of useful information they learned in the course compared to what they had learned in other undergraduate courses: more, less, or the same. The term *useful* was deliberately left ambiguous; each student was to define *useful* in the way that was most meaningful to him or her. Findings are listed in Table 4 and summarized below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Useful information</th>
</tr>
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<tbody>
<tr>
<td>Chuck</td>
<td>more</td>
</tr>
<tr>
<td>Mark</td>
<td>more</td>
</tr>
<tr>
<td>Mary</td>
<td>more</td>
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<td>Mindy</td>
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<td>Shelley</td>
<td>same</td>
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<td>Sean</td>
<td>more</td>
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<td>Rich</td>
<td>less</td>
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</tbody>
</table>

Chuck thought he learned less content but more useful information than in other courses. He believed he learned less content because he had learned much of the information in other courses. He defined “soft” skills such as teamwork and working under pressure as useful information, and he believed Hort/AgEdS 282 offered opportunities to practice such skills much more frequently than other courses he had taken. Chuck stated that “the biggest
thing I’ve gotten from this class is being comfortable [doing presentations] in front of class” (interview, 5/02/02).

When he was asked to compare the amount of useful information he learned in Hort.AgEdS 282 to other classes, Mark unhesitatingly stated, “More!....I’m learning more in this class that I feel is going to help me later on as a teacher than I’m learning in my required AgEd 310 class [a course in educational program planning]” (interview, 3/30/02). He also admitted that Hort/AgEdS 282 had helped him “manage and organize things we had to...get done” (interview, 4/29/02). Mark believed the course was valuable enough that it should be a requirement for all Agricultural Education majors.

Mary grudgingly admitted that although she did not enjoy the course, she felt that she did learn more useful information than in many of her other courses. “Looking back....it was pretty useful. It did build. That was okay” (interview, 4/28/02). She explained that most of what she learned, however, was more affective than cognitive learning. “I did a lot of thinking... [this class] forced me to do a lot of memory work about the home schooling I did with my kids. [It was] emotional” (interview, 4/28/02). She confessed that her “emotional journey” was “painful, but needed to be done” (interview, 4/28/02).

Mindy felt that she learned “less, probably because I’ve had learning theories before” (interview, 4/29/02). She said that although much of the information presented in Hort/AgEdS 282 was quite similar to what she had already learned in previous education courses, Hort/AgEdS 282 provided her with “more ways to apply it” (interview, 3/23/02). She admitted some disappointment in the course content; she “expected to learn a little more about horticulture” (interview, 3/23/02).
Sally did some thinking aloud when she replied that she had learned “about the same, but the difference is, I think I’ll actually remember it” (interview, 5/02/02). She said she would remember it because she “liked it a lot. Because of that....I’ll retain it. I guess you could say, then, that I’ve learned more” (interview, 5/02/02). She believed that what she learned would have lasting utility. “[Knowing] the way people operate, the way people learn...is going to be very useful to me down the road” (interview, 3/23/02).

Sean believed he learned more in Hort/AgEdS 282 than he had learned in other university courses because “it’s stuff related to my major....I think I pay attention more” (interview, 3/23/02). He also admitted that “work[ing] with people who had different ideas than mine...was a learning experience” (interview, 3/23/02).

Shelley thought she learned about the same in every class she took; she confessed that “when we fill out the end-of-the-semester evaluations, I always seem to put ‘average’ for everything....Every class has information that I’m going to get out of it” (interview, 5/1/02). She thought Hort/AgEdS 282 was a little different from most of her other classes, however, she thought what she learned in Hort/AgEdS 282 “might stick a little better” (interview, 5/01/02). She went on to explain that because the course required her to do more than merely memorize information, she would actually retain what she learned.

Rich carefully defined “useful” information as that which he anticipated using some day. “No matter how much I get out of this class, I don’t know whether I will actually use it” (interview, 3/25/02). Although he admitted that some of what he learned might be applicable outside a public garden setting, he believed he learned less in 282 than in other classes simply because he was sure that he would never be an educator in a public garden. “Yeah, I learned stuff, but I doubt if I’ll ever use it” (interview, 4/29/02).
Research Objective 4: to determine if a connection existed between students’ previous learning environments and their reaction to the course.

Table 5. Comparison of Students’ Codings of Learning Environments and Reactions to 282.

<table>
<thead>
<tr>
<th>Student</th>
<th>Coding*</th>
<th>Reaction to 282</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>T, B, E</td>
<td>positive</td>
</tr>
<tr>
<td>Mark</td>
<td>T, B, E</td>
<td>positive</td>
</tr>
<tr>
<td>Mary</td>
<td>T, B</td>
<td>negative</td>
</tr>
<tr>
<td>Mindy</td>
<td>T, B, E, C</td>
<td>positive</td>
</tr>
<tr>
<td>Sally</td>
<td>T, B</td>
<td>positive</td>
</tr>
<tr>
<td>Shelley</td>
<td>T, B, E</td>
<td>positive</td>
</tr>
<tr>
<td>Sean</td>
<td>T, B</td>
<td>negative</td>
</tr>
<tr>
<td>Rich</td>
<td>T, B, E</td>
<td>positive</td>
</tr>
</tbody>
</table>

* T = Traditional, B = Behavioral, E = Experiential, C = Cognitive, S = Structure of the Disciplines

Research Objective 4 was reached by comparing students’ previous learning environments with their reaction to Hort/AgEdS 282. The findings are summarized in Table 5. Chuck, Mark, Shelley, and Rich all had previously encountered learning environments that included Traditional, Behaviorist, and Experiential learning experiences. They all had a positive reaction; they liked Hort/AgEdS 282. Mindy had experienced the same three learning environments, plus a Cognitive learning environment. She also liked the course. Mary, Sally, and Sean had only experienced Traditional and Behaviorist learning environments, but they differed in their reactions to the course. Sally reacted positively, while Mary and Sean reacted negatively to the course.

Research Objective 5: to compare students’ previous learning experiences with how much they believed they learned.

Research Objective 5 was reached by comparing students’ previous learning experiences with how much they believed they learned in the course. The findings are summarized in Table 6.
Table 6: Students’ previous learning environments and useful information learned in Hort/AgEdS 282.

<table>
<thead>
<tr>
<th>Name</th>
<th>Coding*</th>
<th>Useful information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>T, B, E</td>
<td>more</td>
</tr>
<tr>
<td>Mark</td>
<td>T, B, E</td>
<td>more</td>
</tr>
<tr>
<td>Mary</td>
<td>T, B</td>
<td>more</td>
</tr>
<tr>
<td>Mindy</td>
<td>T, B, E, C</td>
<td>less</td>
</tr>
<tr>
<td>Sally</td>
<td>T, B</td>
<td>more</td>
</tr>
<tr>
<td>Shelley</td>
<td>T, B, E</td>
<td>same</td>
</tr>
<tr>
<td>Sean</td>
<td>T, B</td>
<td>more</td>
</tr>
<tr>
<td>Rich</td>
<td>T, B, E</td>
<td>less</td>
</tr>
</tbody>
</table>

* T = Traditional, B = Behavioral, E = Experiential, C = Cognitive, S = Structure of the Disciplines

Chuck, Mark, Shelley, and Rich had all had experienced Traditional, Behaviorist, and Experiential learning environments, but they did not agree on the relative amount of useful information they had gained in Hort/AgEdS 282. Chuck and Mark believed they learned more useful information, Shelley reported learning about the same, and Rich believed that he learned less useful information in Hort/AgEdS 282 than he had learned in his other courses. Each student’s definition of “useful information” varied. Chuck and Mark thought teamwork and working under pressure were useful, Shelley thought youth educational programming was useful, and Rich thought very little he learned in the course was useful.

Mary, Sally, and Sean had all experienced Traditional and Behaviorist learning environments, and they all agreed that they learned relatively more useful information in Hort/AgEds 282 than they had learned in other courses. The type of useful information they learned, however, varied widely. Sally thought it was useful to know how other people think and learn, Sean learned how to compromise with his group members, and Mary admitted that she learned more about herself.

Mindy, who had experienced Traditional, Behaviorist, Experiential, and Cognitive learning environments, believed she learned less in Hort/AgEdS 282 simply because the
information presented in the course had been duplicated in some of her other education courses, and she didn’t learn as much horticulture information as she had expected.

**Research Objective 6**: to compare students’ reaction to the course and how much they believed they learned in the course.

Findings are summarized in Table 7.

Table 7. Students’ reaction to the course and how much they believed they learned.

<table>
<thead>
<tr>
<th>Name</th>
<th>Reaction to 282</th>
<th>Useful information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>positive</td>
<td>more</td>
</tr>
<tr>
<td>Mark</td>
<td>negative</td>
<td>more</td>
</tr>
<tr>
<td>Mary</td>
<td>positive</td>
<td>more</td>
</tr>
<tr>
<td>Mindy</td>
<td>positive</td>
<td>less</td>
</tr>
<tr>
<td>Sally</td>
<td>positive</td>
<td>more</td>
</tr>
<tr>
<td>Shelley</td>
<td>positive</td>
<td>same</td>
</tr>
<tr>
<td>Sean</td>
<td>negative</td>
<td>more</td>
</tr>
<tr>
<td>Rich</td>
<td>positive</td>
<td>less</td>
</tr>
</tbody>
</table>

Students who reacted positively to the course, Chuck, Mark, Mindy, Sally, Shelley, and Rich, disagreed on how much useful information they had learned in the course relative to other courses they had taken. Chuck, Mark, and Sally believed they learned more in Hort/AgEdS 282 than in other courses; Shelley thought she learned about the same in all her courses, Hort/AgEdS 282 included, and Rich believed that he learned less. Mary and Sean, the two students with a negative reaction to the course, believed they learned more in it than they had learned in other courses.

**Conclusions**

Based on students’ previous learning environments and reactions to the course, three groups of students could be identified. The students in the first group, Chuck, Mark, Mindy, Shelley, and Rich, had all experienced learning in an Experiential (E) learning environment
and had reacted positively to *what* and *how* they learned. Their positive reaction to the course may have been influenced by their previous exposure to Experiential learning environments; these students did not have to change their schemas to include Experiential learning environments as legitimate and effective places in which to learn.

Sally, in the second group of students, also had a positive reaction to the course, even though she did not recognize whether or not she had ever learned in an Experiential environment. Sally, however, disliked many of the tenets of Traditional (T) and Behavioral (B) learning environments; she stated that she had learned how to “survive” her educational experiences by doing whatever was necessary to “get by” (interview, 3/23/02). Sally had already fulfilled the first of Strike and Posner’s (1985) conditions for conceptual change; she was dissatisfied with the existing conditions. After having exposure to an Experiential learning environment, Sally met the remaining Strike and Posner conditions, and she made a conceptual change: Experiential learning was a good way to learn.

The third group of students, Sean and Mary, like Sally, had experienced Traditional (T) and Behavioral (B) learning environments in the past and, like Sally, probably had no previous exposure to Experiential (E) learning environments. Unlike Sally, however, Sean and Mary had negative reactions to Hort/AgEdS 282; they disliked the course. Their reactions were also consistent with Strike & Posner’s theory of conceptual change. Sean liked his educational experiences to be “predictable” and “what he was used to” (interview, 1/25/02). Sean had no dissatisfaction with the current system; he had no reason to change his preconceptions of the educational system to include Experiential learning environments. Mary disliked the course as well, and she was very clear about her reasons. She confessed that she feared that the course would conflict with her personal philosophy of education, and
she was right. The course did conflict with her personal philosophy of education; she was unwilling to view it any other way. Although the course offered a variety of projects and delivery methods, Mary observed, "Even though within this class they're trying to do things differently....ultimately, I don't think it's all that different" (interview, 3/24/02). She was unwilling to alter her prior conception.

There did not appear to be a link between students' past learning environments and how much useful information students believed they learned in Hort/AgEdS 282. There may be a link, however, between how much students believed they learned and what they learned. Because all students experienced Traditional and Behavioral backgrounds, it could be assumed that most expected Hort/AgEdS 282 to focus on content rather than personal development. Five students (Chuck, Mark, Mary, Sally, and Sean), however, believed they developed "soft" or social skills that contributed to their personal development in addition to learning course content. Those five students valued the growth and development they acquired in the course; they believed they learned more useful information in Hort/AgEdS 282 than in other university courses. The five students who acquired the soft or professional skills (Graham, 2001) in the course fundamentally agreed with Kunkel (1992), who suggested that colleges of agriculture needed to produce graduates who had "confidence,... responsibility, effort, initiative,...teamwork, common sense, and problem solving...abilities" (p. 2) so they could provide for the needs of a changing world.

Students' positive reactions to the course could not be linked to how much useful information students believed they learned. On the other hand, there may have been a connection between students' negative reactions to the course and how much those students believed they learned. Sean and Mary's negative reaction to the course, however, was
evidently not so severe that it hindered their learning. The somewhat uncomfortable environment for them may have led to personal growth and increased learning. This is consistent with the findings of Terry (2002), who contended that a low level of arousal (or anxiety) actually facilitated learning.

Implications/Recommendations

Posner’s (1995) observation that most students in this country had experienced Traditional or Behavioral learning environments was found to be true, but over half of the students (five) were acquainted with Experiential learning environments as well. Although Experiential learning may not have been as novel as the researchers first believed, instructors at colleges and universities may benefit from the realization that not all students come with the same educational backgrounds, and that students without prior experience in learning environments other than Traditional and Behavioral may require, as did Chuck and Shelley, an adjustment period to a new environment. This conclusion has implications for conscientious administrators, curriculum developers, and instructors who contemplate restructuring courses to maximize student learning. Those who seek to implement educational reforms would be wise to be aware of students’ preconceptions. Sweeping, innovative educational reforms might initially appear promising, but if proposed changes differ greatly from students’ preconceptions of the educational system to which students are accustomed, students who have difficulty in adjusting may offer resistance to those changes. In other words, students’ preconceptions could become frame factors that present barriers to the implementation of such reforms.

Experiential learning environments may offer benefits to educational reformers while minimizing student resistance to change. Most (six) of the students in the study reacted
positively to Hort/AgEdS 282, possibly because they had experienced an Experiential learning environment previously. A majority (five) of the students not only learned more, but different kinds of knowledge and skills than in their more conventional university courses. Those students reported learning teamwork, time management, organization, and communication; skills valued by employers in business and industry (Graham, 2001) as well as advocates of educational reform (Kunkel, 1992). Curriculum developers and educational reformers may benefit from utilizing Experiential learning environments to foster the skills Kunkel (1992) called “fundamental” in graduates who will be able to meet the needs of a changing world. Experientially-based learning seemed to be an effective way to learn the professional skills required in today’s fast-paced, global world of work, regardless of students’ previous educational experiences or their reactions to the course.

The research methods employed in this study were effective for discovering students’ past educational backgrounds and experiences as well as identifying what they had learned in Hort/AgEdS 282. Qualitative research methods such as these can help to uncover the kind of information that will make findings more meaningful. Obviously, many factors, such as student motivation or age could potentially affect what and how students learn in novel educational environments. Additional studies are needed to shed light on connections between students’ past educational experiences and their learning. Further studies are also needed to give a more complete understanding of the nature and variety of students’ past experiences and how preconceptions might affect learning in new educational environments.

In this study, the experientially-based classroom was well-received by students who had previous experience in Experiential learning environments or were dissatisfied with their past learning environments. It may be fruitful to employ experientially-based activities
earlier in students' careers and more frequently at the university level to increase student learning. Then Experiential learning would no longer be as novel and the problem of preconceptions that become barriers to maximized student learning would be reduced.

References


CHAPTER V. UNDERGRADUATES’ LEARNING STYLE AND EXPERIENTIAL LEARNING IN A HORTICULTURE AND AGRICULTURAL EDUCATION COURSE

A paper to be submitted to the Journal of Agricultural Education

Lynnette Davis and Cary J. Trexler

Abstract

In response to calls for educational reform, an innovative course based on experiential learning was created at a Midwest land grant university. Researchers observing the undergraduate course explored the possibility that individual learning styles may have affected students’ comfort in the classroom and their subsequent learning in the novel educational setting. Students from the course were interviewed, and their learning styles were classified using Kolb’s Learning Style Inventory (LSI). Researchers concluded that students’ learning styles did not affect their classroom comfort and learning in the course; in fact, the opposite may have been true. It appeared that the experiential nature of the course allowed students of all learning styles to capitalize on their learning strengths and to strengthen underutilized ways of learning. This study has implications for instructors who seek to maximize student learning by utilizing the principles of learning styles when designing and implementing courses based on experiential learning theory.

Introduction

Sims and Sims (1995) have argued that “the ultimate goal of a college education is to have students obtain life skills so they may apply their collegiate learning experiences to their professional careers” (p. 14.) All students, however, may not be obtaining the life skills they need. The Boyer Commission (1996) summed up the findings of several studies on learning at the nation’s research universities when it stated that many students routinely graduate without knowing how to think logically, write clearly, and speak coherently. In response to calls for educational reform, an innovative course based on the theory of experiential learning was created at a Midwest land grant university. Many educators, including those in Agricultural Education, may believe that “hands-on” learning is the same
as experiential learning. Based on Kolb’s (1984) experiential learning cycle, however, hands-on learning is only the first step in a 4-stage learning process. The process is described as follows: learners (1) engage in a concrete (oftentimes hands-on) experience, (2) reflect and make observations about that experience, (3) develop abstract conceptualizations from the reflections, and (4) actively experiment on the conceptualizations by applying their generalizations in a new concrete experience (Fox & Ronkowski, 1997).

This experiential learning cycle was embedded in the course design of Hort/AgEdS 282, which was taught for the first time in the spring of 2001. Since its inception, the innovative course was scrutinized by researchers who sought to collect and interpret students’ reactions to the novel educational environment. With insight gained from classroom research, the researcher/teacher collaborators hoped to improve pedagogical practice and enhance student learning.

Although student feedback from the course’s first iteration was generally positive, the teachers/researchers perceived that some students were uncomfortable in the unconventional setting and noted some dissatisfaction with the course. As a result, it appeared that these students’ learning was not comparable to that of their contemporaries; they did not take full advantage of the learning opportunities offered in the course.

Studies indicated that a student’s psychological comfort was an important factor in student learning. When students were uncomfortable, their tendency was to escape from the discomfort rather than learn (University of Colorado, 2000). As a result, uncomfortable students experienced impaired learning and performance (Goldstein, 1999; Schell & Black, 1997; Terry, 2000). Student psychological discomfort might come from: 1) the perceived trustworthiness of teachers or friendliness of fellow students, or 2) anxiety. When a teacher
was responsive and pleasant, it built trust; students' engagement and willingness to take on challenging tasks was maximized (Goldstein, 1999). On the other hand, anxious students often “directed their energies to dealing with stress and frustration rather than learning” (Prosperity Secretariat, 1992, p. 31), leading to reduced learning for the student. Terry (2002) agreed with other researchers when he contended that a low level of arousal (or anxiety) actually facilitated learning. He proposed, however, that a high level of anxiety impaired new learning and interfered with recollection of previously learned material. Schell and Black (1997) agreed when they observed that as anxiety surfaced periodically during their course, learning was inhibited.

Several possible explanations were offered for the students' discomfort and subsequent reduced learning in Hort/AgEdS 282. A previous Trexler and Davis (2002) study concluded that students' preconceptions often created barriers to their learning; if students encountered a learning environment that did not match his or her preconceptions, learning was impaired. This study was designed to explore another possibility for some students' inhibited learning in Hort/AgEdS 282: individual learning styles. In other words, the question that guided this study was this: were students' individual learning styles related to discomfort and dissatisfaction (and subsequent impaired learning) they might experience in this experientially-based classroom?

An individual’s learning style has been described as the way learners sort and process information (Cano, Garton, & Raven, 1992) and remains relatively stable over time (Kolb, 1984). Although Terry (2002) has argued that much of the research on learning styles produced more debate than empirical evidence that different people learned differently, Torres and Cano (1995) studied agriculture undergraduates and found that learning style was
"a significant variable...to use in promoting and developing critical thinking abilities in students" (p. 60). Other researchers (Dyer & Osbourne, 1996; Sims & Sims, 1995) agreed with Torres and Cano and further stated that learning style was an important variable for maximum student achievement. Identification of student learning styles and their effects on student problem-solving ability, achievement, and student retention has been described by researchers (Dunn & Dunn, 1979; Gregorc, 1979; Kolb, 1984; Kruzich, Friesen, & Van Soest, 1986; Witkin, Oltman, Raskin, & Karp, 1971).

In a departure from Morgan (1997), who classified learning styles based on perception or interpretation, Kolb (1984) believed that learning was a holistic adaptive process continuously grounded in experience and could be thought of as relearning. Kolb suggested that learning must be achieved through internal confrontation. He theorized that learners needed to choose from polar opposites, or two primary dimensions of the learning process, to be most effective. Kolb described the two dimensions he saw as necessary for learning:

The first dimension represents the concrete experiencing of events at one end and abstract conceptualization at the other. The other dimension has active experimentation at one extreme and reflective observation at the other. Thus, in the process of learning, one moves in varying degrees from actor to observer, and from specific involvement to general analytic detachment (Kolb, 1984, p. 31).
The concrete-abstract dimension, depicted on the vertical axis in Figure 1, represented how learners perceived new information. The active-reflective dimension, depicted horizontally, represented how learners processed what they perceived. Each dimension presented the individual with a choice; over time he or she developed patterned, characteristic ways of choosing. In addition to explaining how an individual learned, this learning model gave rise to Kolb’s theory of learning preferences, which identified an individual’s preferred style of learning.

Kolb observed that the learning process was not identical for everyone; learners typically preferred one or two learning stages more than the others; most learners did not use all four stages equally. The more an individual used and developed certain abilities, the more pronounced his or her learning style became. This observation led to the four learning style
typologies proposed by Kolb (1984) (see Figure 1). The learning typologies are briefly described below.

**Assimilating** – comprehension transformed via intention. Assimilators learn by thinking and watching. They can assimilate diverse, separate data into an integrated whole. Because they like to work alone, they do well in traditional lecture-oriented classrooms (Kolb, 1984; Sharp, 1997).

**Converging** – comprehension transformed via extension. Convergers learn by thinking and doing. They converge quickly to reach a conclusion or a single, correct answer. They like to work with things rather than people, and prefer “hands-on” work over lectures (Kolb, 1984; Sharp, 1997).

**Accommodating** – apprehension transformed via extension. Accommodators learn by concrete sensory information (feeling) and doing. They are problem-solvers and risk-takers. They adapt well to new circumstances and like to apply knowledge in new ways. They thrive on working with others and in unstructured settings (Kolb, 1984; Sharp, 1997).

**Diverging** – apprehension transformed via intention. Divergers learn by feeling and watching. They are concerned about people and seek harmony. They excel at viewing life from many perspectives and are good brainstormers. They like to share ideas with others and are good at working in groups (Kolb, 1984; Sharp, 1997).

Each learning style had its strengths and weaknesses, and no single learning style was best. The most versatile learners, however, were able to competently use each mode when necessary (Hay/McBer Training Resources Group, 2000).

The constructs of learning styles or cognitive styles have been shown to have important implications for education. Dunn and Dunn (1979) believed that not only did
students learn in different ways, but that certain students could learn only through specific teaching methods. A variety of researchers (Dunn & Dunn, 1979; Gregorc, 1979; Witkin, 1973) determined that teachers possessed different teaching styles and further suggested that teachers taught the way they learned. Brock and Cameron (1997) contended that mismatches between a professor’s teaching preferences and a student’s learning preferences could (1) reduce the professor’s enthusiasm for teaching and (2) cause students to perform below their potential.

Researchers in agricultural education (Cano, Garton, & Raven, 1992; Torres & Cano, 1995; Whittington & Raven, 1995) conducted descriptive studies regarding the demographics of students’ and instructors’ learning styles. They urged that “research need[ed] to continue along this line of inquiry” (Torres & Cano, 1995). A review of the literature found no studies, however, which explored the practical implications of students’ learning styles on their learning in an experientially-based classroom. Riding and Rayner (1998) agreed that such studies were rare and stated that “the implications of cognitive style for the educator…are far-reaching, but to date conspicuously underdeveloped in working practice” (p. 7).

This study was designed to fill the aforementioned gap in the literature. Research was conducted in an experientially-based classroom to discover if comfort and satisfaction, learning style, and student learning were related in such a setting.

**Purpose/Objectives**

This study sought to determine if students’ perceptions of comfort and/or learning were influenced by their learning styles in an experientially-based course in horticulture and agricultural education. The purpose of this study was to discover if an individual’s learning
styles affected his or her comfort and learning in such a classroom. The objectives of the study were to:

1. Identify the learning styles of students,
2. Determine students’ satisfaction and comfort levels experienced, and
3. Compare students’ individual learning styles with their satisfaction and comfort levels during the course.

**Method**

**Setting**

At a Midwest land-grant university, students and co-instructors were studied in the Hort/AgEdS 282 course, a semester-long class taught for the first time the previous year. The course combined the disciplines of horticulture and agricultural education and allowed undergraduates to develop interpersonal skills as they created curriculum materials and garden exhibits for youth. The three-credit course met four hours on Mondays and one hour on Wednesdays for the entire semester. The course had two instructors from two departments: one from Horticulture and one from Agricultural Education.

The Hort/AgEdS 282 curriculum was structured around experiential learning theory. Experiential learning, most prominently espoused by John Dewey (1938), advocated learning by doing and then reflecting on the experience. Kolb (1984) expanded Dewey’s concepts and, as stated earlier, proposed that learning encompassed: 1) a concrete experience, 2) reflection on that experience, 3) abstract conceptualization that arose from reflection, and then 4) active experimentation, which led to a new concrete experience that started the cycle again. The instructors infused Kolb’s experiential learning theory into the course by providing educational experiences that students were to reflect on as they learned about
horticulture and learning. These insights were later to be actively implemented as students designed exhibits for the university’s public garden. Experiential learning activities included field trips, the opportunity to plan and conduct educational tours for local children, hands-on horticulture activities, and opportunities for individual reflection.

**Population**

The population for the study was the students enrolled in Hort/AgEdS 282. Of the 25 students in the class, eight students volunteered to take part in the study. Of the eight volunteers, four were males and four were females. Two of the students were sophomores, four were juniors, and two were seniors. Students represented three departments: one student was an Elementary Education major, three were Agricultural Education majors, and four were Horticulture majors. One student was an adult student in her mid forties; all others were traditional aged students in their early twenties. All students were Caucasian.

**Research Methods**

This qualitative study employed several methods. For Objective 1, the researcher sought to determine the volunteers' individual learning styles. Kolb's (1984) Learning Styles Inventory (LSI) was used because its principles of experiential learning were consistent with the principles employed in the course's design. An on-line version of Kolb's (1984) Learning Styles Inventory was administered to the eight volunteer students and to the course's two instructors. The Learning Styles Inventory was taken in the computer lab during the class's scheduled lab time, and inventory results were available to each student immediately upon completion. Copies of each participant's results were also e-mailed to the researcher that same day.
To determine students’ satisfaction and comfort in Hort/AgEdS 282 during the semester (Objective 2), eight volunteer students were individually interviewed. A general interview guide was prepared to ensure that the same information was obtained from all interviewees (Patton, 1990). Besides making the interview process more systematic, the interview guide approach allowed the researcher to use the interview time more efficiently. Interview questions were reviewed by experts before being asked of students. Interview questions asked students 1) about their previous educational experiences, 2) whether they liked or disliked the course, and 3) to compare the amount of “useful” information they received in Hort/AgEdS 282 to other classes. The definition of the term “useful” was deliberately left to each student’s interpretation. The eight volunteers were interviewed on three occasions: first, at the beginning of the semester, second, about midway through, and finally, during the last week of class. All interviews were audio taped and transcribed, serving as primary data sources. The first and third interviews lasted approximately 45 minutes each. The second round of interviews was somewhat shorter, usually lasting less than 30 minutes each. One student missed the final interview; attempts to reschedule the interview were unsuccessful. All other students completed the entire series of interviews.

In addition to the interviews used to reach Objective 2, ethnographic field notes were used to help determine student satisfaction/dissatisfaction and comfort/discomfort with the course. Fetterman (1998) stated that ethnographic studies detect predictable patterns of human thought and behavior through direct observation. Hammersly (1990) used direct observation as he engaged in classroom ethnographic research to “understand the social processes involved in classroom interaction” (p. vii). Conversations, lectures, and behaviors of students and instructors were observed and documented, which allowed the researcher to
identify and note any unusual or interesting behaviors or critical incidents. The responses from the interviews and the ethnographic field notes describing actions observed during class time were closely examined to determine students’ reactions to the class.

**Data Analysis**

The researcher sought to establish validity, credibility, dependability, and confirmability, all important in establishing the truth value, applicability, consistency, and neutrality of qualitative research (Erlandson, Harris, Skipper, & Allen, 1993). Validity was established through triangulation; multiple sources of data were used. Credibility was obtained through prolonged engagement with research subjects; the researcher was present and recorded observations at every class session throughout the semester. Dependability was achieved with audio-taped conversations and written notes. Excerpts from raw data included in the study and the audit trail both provided confirmability.

Biases and personal experiences of the ethnographer influenced interpretation of the data. Because she knew both instructors personally and understood the theory behind the curriculum design, she may have brought a positive bias to her analysis of data. Realizing this, she tried to “bracket” her biases by explicitly stating them prior to analysis of field notes. As with all ethnographic studies, there is the possibility that biases influenced the interpretation of the data and subsequent conclusions and recommendations.

To discover students’ satisfaction and comfort in Hort/AgEdS 282, data were searched for “vocabulary, conversation topics, recurring activities, meanings, and feelings” (Taylor & Bogdan, 1998).

**Findings**

Findings of the study are organized in the following section by research objectives.
Objective 1: Identify Learning Styles of Students

The learning style typologies of the students that resulted from taking Kolb’s Learning Style Inventory are listed in Table 1.

<table>
<thead>
<tr>
<th>Name</th>
<th>Learning Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>Assimilator</td>
</tr>
<tr>
<td>Mark</td>
<td>Accommodator</td>
</tr>
<tr>
<td>Mary</td>
<td>Converger</td>
</tr>
<tr>
<td>Mindy</td>
<td>Assimilator</td>
</tr>
<tr>
<td>Sally</td>
<td>Accommodator</td>
</tr>
<tr>
<td>Sean</td>
<td>Converger</td>
</tr>
<tr>
<td>Shelley</td>
<td>Accommodator</td>
</tr>
<tr>
<td>Rich</td>
<td>Accommodator</td>
</tr>
<tr>
<td>Instructor 1</td>
<td>Converger</td>
</tr>
<tr>
<td>Instructor 2</td>
<td>Converger</td>
</tr>
</tbody>
</table>

Chuck and Mindy were coded as Assimilators, Mark, Sally, Shelley, and Rich were Accommodators, and Mary and Sean were found to be Convergers. The two instructors were found to be Convergers as well. Although the distribution of learning styles is fairly even across the general population (Kolb, 1983), in this sample of ten individuals, Accommodators and Convergers were disproportionally represented, and Divergers were absent. A larger sample may not have produced a more even distribution of learning style typologies; individuals with similar learning styles tended to gravitate toward certain disciplines (Kolb, 1984). In other words, Divergers, the learning style not represented in this sample, may have chosen to pursue disciplines other than horticulture or agricultural education.

Objective 2: Student Satisfaction and Comfort

Students’ satisfaction and comfort in the course were determined through interviews and classroom observations documented in field notes.
Satisfaction

Student satisfaction was measured by the following factors: 1) how much the student felt he or she learned as compared to other college courses, 2) whether or not the course met his or her expectations, and 3) whether or not he or she liked the course. Student overall satisfaction is listed in Table 2.

Table 2. Student Overall Satisfaction with Hort/AgEdS 282.

<table>
<thead>
<tr>
<th>Student</th>
<th>Learned?</th>
<th>Expectations met?</th>
<th>Liked course?</th>
<th>Satisfied?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>More</td>
<td>Partially</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mark</td>
<td>More</td>
<td>Exceeded</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mary</td>
<td>More</td>
<td>Yes, but negative</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mindy</td>
<td>Same/less</td>
<td>Partially</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sally</td>
<td>Same/more</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sean</td>
<td>More</td>
<td>Partially</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Shelley</td>
<td>Same</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rich</td>
<td>Less</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Chuck believed he learned more in Hort/AgEdS 282 than he had learned in other college courses. He thought that learning how to "get things done, working in a team, getting up and speaking to the class...were more valuable than any facts you're going to learn" (interview, 5/02/02). His expectations for the course were partially met; he "expected more horticulture" (interview, 3/23/02), but since he admitted that he knew nothing about it previously, he would "know twice as much hort as I've ever known before....so I'm pleased. Not displeased" (interview, 3/23/02). Chuck liked the course. "It was good. It made you think and learn different things" (interview, 5/02/02). Overall, Chuck was satisfied with Hort/AgEdS 282.

Mark thought Hort/AgEdS contained a great deal of useful content – more than other classes he had taken. "I'm learning more in this class that I feel is going to help me later on as a teacher than I'm learning in my required AgEd 310 class [a course in educational
program planning)” (interview, 3/30/02). Hort/AgEdS 282 exceeded Mark’s expectations. “I didn’t think we would get so far into depth with learning styles and that stuff” (interview, 3/30/02). He really liked the course and recommended that the university create an “upper level 282 next year” (interview, 4/28/02). Mark was extremely satisfied with the course.

Mary grudgingly admitted that she probably learned more in Hort/AgEdS 282 than she had learned in other university courses, although she confessed that much of what she learned was personal rather than academic. Even before taking the course, Mary confessed that she had a very negative view of public education and believed that students’ creativity and appreciation for nature were stifled in favor of efficiently delivered facts. She expected that her opinions of the educational system would be verified throughout the course, and she was right. She observed that even though the instructors were “trying really hard to make it different than other classes…ultimately I don’t think it’s all that different” (3/24/02). Mary did not like the course; she described it as “repulsive” because it “went against the grain” (interview, 4/25/02) of her personal philosophy of education. She privately retitled the course “How to Take Kids into a Garden and Take All the Fun Out of It” (interview, 4/25/02). The only thing about the course that Mary was satisfied with was that it fulfilled a graduation requirement; she was not satisfied with any other aspects of the course.

Mindy thought she learned about the same or a little less than she had learned in other university courses. She said that much of the information presented in Hort/AgEdS 282 was quite similar to information she had already learned in previous education courses, but Hort/AgEdS provided “more ways to apply it” (interview, 3/23/02). Her expectations for the course were partially met; she learned more about how children learned, but not as much about plants as she would have liked. “I expected to learn a little more about horticulture”
Overall, Mindy liked the class and said it would make her a better teacher. The content of the course made her think “as a teacher...what I need to look for when I...go on a field trip” (interview, 4/29/02). Mindy was satisfied with the course.

When asked if she had learned more, less, or about the same as in other university courses, Sally replied that she had learned “about the same, but the difference is, I think I’ll actually remember it” (interview, 5/02/02). She said she would remember it because “I liked it a lot. Because of that....I’ll retain it. I guess you could say, then, that I’ve learned more” (interview, 5/02/02). Sally was quite easygoing about any expectations for the course and stated that “it’s not meeting and it’s not exceeding my expectations as far as what I’m actually taking away from it” (interview, 3/23/02). She “thought it was a good course” (interview, 5/02/02) and had recommended it to her roommate in elementary education. Sally was satisfied with the course.

Sean believed he learned more in Hort/AgEdS 282 than he had learned in other university courses because “it’s stuff related to my major....I think I pay attention more” (interview, 3/23/02). He carefully admitted that the class met his expectations. “I knew there was going to be a lot of group interaction. I knew there was going to be a lot to do on your own....and it has been” (3/23/02). But there were things about the class that bothered him as well. “There’s a lot of things getting in my way [of learning]. I’d rather not say [what they are]. Some of it is instructors, and some of it is my group.” (interview, 3/23/02). Although Sean would not give his opinion of the course, he mentioned that “sometimes it’s a little hectic” (interview, 3/23/02). During class time, especially lab sessions, Sean seemed tense and harried, and he did not appear to enjoy the activities as much as his classmates (field notes, 2/10/02, 4/8/02). Sean probably did not like the course. He diplomatically
commented that “if you had your whole course load like this, it would be a little chaotic” (interview, 3/23/02). The researcher concluded that Sean was not satisfied with the course.

Shelley had a take-life-as-it-comes attitude toward her university courses and stated, “I learn what I learn from classes. Every class has information that I’m going to get out of it” (interview, 5/01/02). However, she thought Hort/AgEdS 282 was a bit different from her usual courses and remarked that what she learned “might stick a little better” (interview, 5/01/02) because she actually used the information she had learned. Shelley thought Hort/AgEdS 282 was a “very good class” (interview, 5/01/02) and would only get better as instructors taught it more. Shelley was satisfied with the course.

Rich admitted that he only enrolled in the course because he needed the horticulture credits for graduation. He confessed that he had learned a lot in the course but felt the information was not useful to him. He was doubtful that he would ever use what he had learned because he never intended to teach children in a public garden setting. Rich admitted that he didn’t have many expectations for the course. “I didn’t know what to expect. I figured there was going to be some things… I liked, some things I didn’t like. I would say it’s meeting those expectations” (interview, 3/25/02). Even though he had some complaints about assignments, Rich stated, “I like the class. It’s all hands-on. That’s really what does it for me” (interview, 3/25/02). In a later interview, though, when asked if he liked the course, he said, “Yes and no. It all revolves around my grade…. If I don’t get an A, I won’t say I don’t like the class, but I’ll be disappointed” (interview, 4/29/02). Rich grudgingly admitted that he “did learn stuff” (interview, 4/29/02), and that “it was kind of nice [when] we’re supposed to be learning… about how to do stuff with kids [and] we actually got to do something with them” (interview, 3/25/02). Rich was basically satisfied with the course.
Comfort

Students' comfort was self-reported during interviews and observed during class time. These data are presented in Table 3.

Chuck admitted that in the beginning, the class was “different....At first it was a little culture shock” (interview, 3/23/02). After he got used to how the class was conducted, Chuck conceded, “For the most part, I like it....I’m adjusting.” (interview, 3/23/02). He could see his confidence build as the semester progressed and commented, “[At first] I found it intimidating to get involved in class discussion....Toward the end I was fine” (interview, 5/02/02). Chuck was comfortable in class.

Table 3. Students’ Comfort in Hort/AgEdS 282.

<table>
<thead>
<tr>
<th>Name</th>
<th>Comfortable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>Yes, after initial adjustment</td>
</tr>
<tr>
<td>Mark</td>
<td>Yes, thought this was what all classes should be like</td>
</tr>
<tr>
<td>Mary</td>
<td>No – went against her principles of education; she was relieved when course was finished</td>
</tr>
<tr>
<td>Mindy</td>
<td>Yes, similar to her other education classes</td>
</tr>
<tr>
<td>Sally</td>
<td>Yes, liked thinking outside the box</td>
</tr>
<tr>
<td>Sean</td>
<td>No – seemed frustrated &amp; harried, especially during labs; had personality &amp; scheduling conflicts with group members</td>
</tr>
<tr>
<td>Shelley</td>
<td>Yes, after initial adjustment</td>
</tr>
<tr>
<td>Rich</td>
<td>Yes – he had good days and bad days, just like other classes</td>
</tr>
</tbody>
</table>

Mark admitted that some days in class were “more challenging and stressful than I needed” (interview, 4/29/02), but conceded that his stress was related to working with his group members’ schedules more than other class-related issues. Mark felt comfortable in the class from the beginning and commented that all courses should be like Hort/AgEdS 282. “It should be the typical [class], but it’s not. It’s more of a peer learning community than a classroom with a professor” (interview, 4/29/02).
Mary, on the other hand, did not always feel comfortable in class, but she admitted that some of her discomfort stemmed from her age — she was an adult student. She acknowledged that her discomfort was not the fault of instructors; it was “just the way life was” (interview, 1/5/02). Mary’s primary source of discomfort in Hort/AgEdS 282 stemmed from her personal educational philosophy that she believed disagreed with the course’s content. Mary knew before taking the course that it would be difficult for her; she viewed Hort/AgEdS 282 as “just something to get through” (interview, 4/28/02).

Mindy, the elementary education major, felt comfortable in class and observed that experiential learning was “common... in my education classes” (interview, 4/29/02). She admitted that Hort/AgEdS 282 and her other education classes were sometimes frustrating for her “because it’s not the way I’m used to learning....Our generation has primarily been taught with lecture” (interview, 3/23/02). Mindy believed, however, that lecture “took the fun out of [learning]” (interview, 4/29/02) and was comfortable in Hort/AgEdS 282.

Sally really liked the small and large group discussions that took place in class. She believed the information she learned was valuable, and she felt the delivery method was good for her way of learning. “You can find [this information] in books, but it’s so much more digestible when it’s fed in this kind of classroom group discussion” (interview, 3/23/02). She called Hort/AgEdS 282 “drastically different than all other classes....a refreshing surprise” (interview, 3/23/02). Sally especially liked the instructors, who made her feel like she could customize her learning to her own needs and interests. Consequently, Sally was comfortable in the course.

Sean spoke guardedly during interviews about his opinions of Hort/AgEdS 282. He was probably being diplomatic when he called the class “a little hectic, not knowing exactly
what we’re going to be doing” (interview, 3/23/02). When asked if he found the loose structure of the class to be worrisome, uncomfortable, or frustrating, he replied, “It’s not worrisome, but I like to have things done in advance” (interview, 3/23/02). Sean refused to be specific about his frustrations. At one particular lab session in which students were transplanting seedlings, Sean appeared to be particularly uncomfortable. “Although he smiled & wanted to appear to be joking [with classmates], he seemed quite agitated about something” (field notes, 4/08/02). Sean’s apparent stress during class was noted in field notes several times throughout the semester; he did not appear to be comfortable in class.

Like Chuck, Shelley spoke for herself and other students who needed an initial adjustment to Hort/AgEdS 282. She commented, “We all felt a little uneasy at first but we got used to it. Because we weren’t familiar with it compared to other classes” (interview, 5/1/02). Shelley’s initial discomfort, however, disappeared quickly. She reported that “once we figured out the style of teaching, we could [see] what was happening. We got more comfortable with the idea” (interview, 5/1/02). After her initial adjustment, Shelley was comfortable in class.

Rich was comfortable in applied situations and appreciated the fact that the class was “all hands-on....We don’t have textbooks. We don’t have to read a book and try to learn something....You go to class. You’re pretty much going to understand” (interview, 3/25/02). When he had to do a presentation for class, however, he admitted, “I was uncomfortable with the presentations we did. I didn’t fully understand the material” (interview, 4/29/02). Rich blamed his discomfort on his own personality, though, rather than on the class. “If I really don’t understand [something], I might not ask” (interview, 4/29/02). He did not care for the demands of the class; he commented that “I put way more work into this class that I
thought I was going to have to” (interview, 4/29/02). Although he thought the class was a lot of work, Rich believed that “if you show up and do the work, you’ll do fine. That was kind of plus for me. It took some of the pressure off” (interview, 4/29/02). Although Rich had some complaints about the class, he felt it was a fairly typical university course and remarked that “you have good days and bad days. Sometimes you think the teachers are great, and some days you want to strangle them. That’s pretty much every class, really” (interview, 4/29/02). Based on the fact that Rich regarded the class as fairly typical, he was comfortable in Hort/AgEdS 282.

**Objective 3: Comparison of Learning Styles with Satisfaction and Comfort**

When students’ learning styles were compared to their satisfaction and comfort in the Hort/AgEdS 282, the following results were obtained. These results are listed in Table 3.

<table>
<thead>
<tr>
<th>Name</th>
<th>Learning Style</th>
<th>Satisfaction</th>
<th>Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuck</td>
<td>Assimilator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mark</td>
<td>Accommodator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mary</td>
<td>Converger</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mindy</td>
<td>Assimilator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sally</td>
<td>Accommodator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sean</td>
<td>Converger</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Shelley</td>
<td>Accommodator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rich</td>
<td>Accommodator</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The Assimilators, Chuck and Mindy, were satisfied with and comfortable in Hort/AgEdS 282, as were the Accommodators, Mark, Sally, Shelley, and Rich. The two Convergers, Mary and Sean, were not satisfied with the course and were not comfortable in it.
Conclusions/Implications

Because of the small number of respondents in the study, care must be taken to not generalize these findings to a larger population. However, several observations may raise questions for further research.

First, Sean and Mary, the two student Convergers, did not like the class. It might be concluded that their dissatisfaction and discomfort stemmed from their preferred learning style. Their dissatisfaction and discomfort may be attributed to other factors; Mary admitted that her discomfort stemmed primarily from her age and from her philosophy of education, which she felt conflicted with the philosophy of the course. Early in the semester Sean acknowledged that he was looking forward to the class; he liked group work and was interested in the subject matter. He admitted that the class fulfilled his expectations. Under these circumstances, it might seem likely that Sean’s discomfort, although observed during class time, could have actually been related to personal issues (he dropped out of school at the end of the term) or other problems unrelated to the course. Because many factors contribute to each student’s comfort and satisfaction in any course, and because Divergers were absent in this group of students, more research is needed to discover if there is indeed a correlation between student satisfaction and comfort in the course and his or her learning style in an experiential learning environment.

The second observation from this study was that students with the other learning styles (Accommodators and Assimilators) liked the course and were satisfied with what they learned. This may be due to the experiential nature of the course. By Kolb’s (1984) definition, an experiential course takes students through all four stages of the learning cycle. In each stage, one style is more heavily favored than the others. Therefore, it seems
reasonable to assume that no matter what a student's learning style was, he or she had opportunities at various times throughout the semester to use his or her learning strengths while improving learning weaknesses (Brock & Cameron, 1997) in a supportive group environment. This could have led to student satisfaction and comfort in the class.

**Recommendations**

Based on the results of the study, several recommendations are offered. First, consistent with recommendations from other researchers (Brock & Cameron, 1999; Sharp, 1997), it may be beneficial to consider learning styles when designing and teaching courses to maximize student learning. As Riding and Rayner (1998) have suggested, an awareness of different learning styles has potential for enhancing and improving human performance in educational contexts. Experientially-based undergraduate courses such as Hort/AgEds 282 allow students to learn through all four phases of Kolb's learning cycle (not just the first phase, a concrete or hands-on experience) and may lead to more versatile learners who can apply their collegiate learning experiences to their professional careers.

Second, instructors may benefit from exploring learning theory and employing a variety of teaching styles when helping their students to learn. Utilizing a variety of teaching styles in a classroom accomplishes dual goals: (1) it allows students to “shine” in their learning strengths and to strengthen their learning weaknesses (Hay/McBer TRG, 2000), and (2) it helps instructors serve a wide range of students, a challenge Scanlon (1995) contends will become increasingly common in colleges of agriculture as well as other disciplines.

Third, research needs to continue to shed light on how students’ learning styles might affect their learning in specific contexts. Because the individual learner is the primary focus of the instructional system, the learner must be the basis of learning research (Sims & Sims,
Because the classroom research methods employed in this study reported the voices of individual learners, these methods were more effective than quantitative studies in describing learning styles in practical terms. More such studies are needed to further portray connections between learning styles, teaching styles, and classroom environments.

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CHAPTER VI. CONCLUSIONS AND IMPLICATIONS

Based on the findings of this study, I draw conclusions and offer implications in this chapter. The conclusions and implications that follow are organized according to the nine research objectives of the study. The conclusions and implications offer educators, curriculum developers, or researchers other avenues to consider for maximizing student learning by strengthening undergraduate education.

Research Objective 1: Identify students’ previous learning environments by examining students’ preconceptions of the educational system.

Conclusions

Consistent with Posner’s (1995) observations, all students had experienced Traditional (T) and Behavioral (B) learning environments. Five students had been in Experiential (E) learning environments, which may indicate that such learning environments may not have been as novel as originally believed.

Implications

Currently, undergraduate educators may correctly assume that most students in their courses will have preconceptions and expectations derived from Traditional and Behavioral learning environments, but based on the findings of this study, Experiential learning environments were not as novel as the researcher originally thought. As educators seek to reform education through a variety of new ways, previously underused ways of learning likely may be implemented in primary and secondary schools throughout the country. As this occurs, incoming college and university students’ preconceptions and expectations will probably be influenced by their new learning environments; educators may see
undergraduates with a wider variety of educational backgrounds. This study points out the utility of understanding (1) students’ preconceptions and expectations that derive from their previous learning environments and (2) students’ resistance to conceptual change as educators guide students through novel and familiar learning environments.

**Research Objective 2:** Determine students’ reaction to Hort/AgEdS 282.

**Conclusions**

Six students, Chuck, Mark, Mindy, Sally, Shelley, and Rich reacted favorably to the course; they liked it. Two students, however, had negative reactions. Mary and Sean did not like the course. There could be several explanations for their reactions. Perhaps Sean and Mary needed more time to adapt to the new educational environment. It is also possible that they devalued experiential learning and were unwilling to make conceptual changes to include Experiential learning environments as legitimate settings in which to learn. This is consistent with the observations of Boud (1989), who stated that experiential learning has been traditionally regarded as inferior in the formal educational system.

**Implications**

Experiential education may not always enjoy the same status as academic and abstract disciplines in formal education systems (Boud, 1989), but there is “a dawning recognition of learning from experience” (p. xi) in higher education. More people than Sean and Mary will have to make conceptual changes before the potential of experiential education can be fully recognized. As greater numbers of innovative curriculum developers and instructors utilize experiential education in higher education classrooms, the positive results of such practices may convince others of its legitimacy.
**Research Objective 3:** Ascertain how much students believed they learned in Hort/AgEdS 282 relative to other courses they had taken.

**Conclusions**

Three students, Shelley, Mindy, and Rich, believed they learned about the same or less in Hort/AgEdS 282 than they had learned in other university courses they had taken. Perhaps these students were disappointed in the amount of useful information they acquired from the course because they expected to learn content when the course emphasized the development of individuals. In other words, Shelley, Mindy, and Rich may have missed the point of the course. MacKay et al. (1999) observed the same phenomenon in their experientially-based course; students “did not recognize the educational processes in which they participated” (p. 273). Shelley’s, Mindy’s, and Rich’s preconceptions prevented them from taking full advantage of the learning opportunities available in Hort/AgEdS 282.

**Implications**

Instructors may help students learn in Experiential learning environments by explaining the new learning model and the underlying reasons for it. Consistent with recommendations made by MacKay et al. (1999), more attention should be given to explaining the principles of the experiential learning process in which the students will participate. A greater understanding of the process could translate into greater learning.

Determining how much students learned from their courses is a challenging task when avoiding commonly accepted measures of student learning such as grades or tests. For this study it seemed appropriate to ask the students themselves, not the instructors, if they acquired useful information, and if they acquired more useful information than usual. This
kind of data could not be obtained by looking at teacher-assigned grades; such grades do not indicate whether students got what they wanted out of a course. Additional studies that employ qualitative research methods would allow researchers to understand more fully students' perceptions of the value and utility of their learning. Studies that explore students' perspectives of the educational system would give curriculum designers a better insight into what students believe they need.

**Research Objective 4:** Discover if there was a connection between students' previous learning environments and their reaction to the course.

**Conclusions**

Two groups of students were identified based on their previous learning environments: (1) those with prior experience in Experiential learning environments, and (2) those without. Students accustomed to Experiential learning environment reacted positively to Hort/AgEdS 282; no conceptual change was needed. The students who had no prior exposure to Experiential learning environments could be categorized as (a) satisfied with past learning environments, or (b) dissatisfied with past learning environments. Students who were satisfied with past learning environments reacted negatively to Hort/AgEdS 282; no conceptual change was made. The student who was dissatisfied with her past learning environment made a conceptual change and reacted positively to the course.

**Implications**

A student's previous educational experiences may be useful in predicting receptivity to a specific educational environment; in this study, previous exposure to an Experiential environment or dissatisfaction with past learning environments seemed to be related to
students’ positive reactions to Hort/AgEdS 282. Knowledge of students’ previous educational experiences may help advisors and instructors steer students toward courses that may be beneficial in maximizing their learning. Instructors might ease students without prior experience in Experiential learning into the new environment gradually. Instructors could link the novel learning environment to something familiar to students, thereby facilitating its entry. These techniques may increase the likelihood of students’ positive reactions, which, in turn, may increase the likelihood that the students’ next experiences with Experiential learning environments would also be positive.

**Research Objective 5:** Discover if there was a connection between students’ previous learning environments and how much they believed they learned in the course.

**Conclusions**

Although there seemed to be no connection between students’ previous learning environments and how much they believed they learned, there appeared to be a connection between how much and what they learned. Students who recognized they had acquired personal development skills believed they learned more in Hort/AgEdS 282 than students who thought of learning solely as knowledge gains in content.

**Implications**

Experiential learning environments appear to foster the growth of the developmental or professional skills which Kunkel (1992) and Graham (2001) believed are needed to produce competent graduates. Other educators may find Experiential learning environments fruitful for developing skills desired by employers.
Research Objective 6: Explore possible connections between students’ reaction to the course and how much they believed they learned in the course.

Conclusions

There seemed to be no connection between students’ favorable reactions to the course and how much they believed they learned, but both students who reacted negatively thought they learned more in Hort/AgEdS 282 than in other courses. Student reaction could have been related to a plethora of other factors (e.g., personality, motivation level, age, or other factors). Students who liked the course differed as to the amount of useful information they gained. Students who reacted negatively to the course believed they learned more useful information than in other courses, a finding which is consistent with the observations of researchers (Terry, 2000; Schell & Black, 1997) who contended that a low level of discomfort actually facilitated learning.

Implications

Apparently Sean and Mary’s negative reactions to Hort/AgEdS 282 were not strong enough to create frame factors that presented barriers to their learning; they learned more despite the fact that they disliked the course. Sean and Mary both reported learning developmental skills in the course; there may be a link between slightly uncomfortable learning environments and learning such skills. More research should be conducted to establish if such a link exists.

Research Objective 7: Identify the eight selected students’ learning styles based on Kolb’s Learning Style Inventory.
Conclusions

The students in the study represented three of Kolb’s four Learning Styles: Accommodators, Assimilators, and Convergers. Divergers were absent. Students in colleges of agriculture tended in Kolb’s research to be Convergers (horticulturists, agronomists) or Accommodators (educators). Therefore, the eight students in this study were probably fairly representative of students in a college of agriculture.

Research Objective 8: Determine students’ satisfaction and comfort levels experienced during the iteration of Hort/AgEdS 282.

Conclusions

Chuck, Mindy, Mark, Sally, Shelley, and Rich, were satisfied with and comfortable in Hort/AgEdS 282. Mary and Sean were not satisfied with the course and were not comfortable in it.

Implications

Clearly, more research is needed to discover if there is indeed a link between student satisfaction and comfort in the course and his or her learning style.

Research Objective 9: Compare the eight students’ learning styles with their ability to adapt to an experientially-based learning environment.

Conclusions

The two Convergers reacted negatively to the course and did not appear to be comfortable in it. Although there were no Divergers in the study, Accommodators and Assimilators reacted positively to the course and appeared to be satisfied with what and how
they learned. Their positive reactions may be due to the nature of experientially-based
courses, which took students through all four stages of the learning cycle (Kolb, 1984. By
helping students move through all four phases, students of all learning styles would have
opportunities to use learning strengths while improving learning weaknesses (Brock &
Cameron, 1997). Hence, it is reasonable to believe that students of all four learning styles
could be comfortable in an experientially-based course. More studies are needed to test this
conclusion.

Implications

Experientially-based courses appear to have the potential to be comfortable learning
environments for students of all learning styles while offering opportunities for students to
“stretch” their learning abilities beyond their preferred learning style. Curriculum developers
and instructors could potentially maximize student learning by designing and implementing
experientially-based courses in undergraduate education. Instructors who believe they are
currently teaching in an experiential way might benefit from scrutinizing their teaching
practices to see if students are indeed being led through all four phases of Kolb’s learning
cycle.

This study has added to the body of knowledge on students’ preconceptions and on
students’ learning styles. If curriculum developers, instructors, and researchers have a better
idea of some of the frame factors surrounding the implementation of changes, namely the
aforementioned student preconceptions and learning style preferences, innovative educators
can more effectively plan and execute those changes.
Appendix A

HUMAN SUBJECTS REVIEW FORM
**Checklist for Attachments**

The following are attached (please check):

13. ☑ Letter or written statement to subjects indicating clearly:
   a) the purpose of the research
   b) the use of any identifier codes (names, #s), how they will be used, and when they will be removed (see item 18)
   c) an estimate of time needed for participation in the research
   d) if applicable, the location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, when and how you will contact subjects later
   g) that participation is voluntary; nonparticipation will not affect evaluations of the subject

14. ☑ A copy of the consent form (if applicable)

15. ☐ Letter of approval for research from cooperating organizations or institutions (if applicable)

16. ☑ Data-gathering instruments

17. Anticipated dates for contact with subjects:
   First contact: 01/19/02
   Last contact: 05/10/02

18. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

   Month/Day/Year

19. Signature of Departmental Executive Officer: [Signature]
    Date: 1-14-02
    Department or Administrative Unit: [Signature]

   If the PI or co-PI is also the DEO, a Dean signature authority must sign here.

20. Initial action by the Institutional Review Board (IRB):
   ☑ Project approved
   ☐ Pending Further Review
   ☐ Project not approved

   Date

21. Follow-up action by the IRB:
   ☑ Project approved
   ☑ Project not approved
   ☐ Project not resubmitted

   Date

**Signature of IRB Chairperson:**

**Date:** 7/01
Appendix B

INFORMATIONAL LETTER TO STUDENTS

AND

STUDENT PERMISSION FORM
January, 2002

To Hort/AgEdS 282X Research Study Participants:

I am a Master's student in Agricultural Education and Studies gathering research for my thesis. My major professor is Cary J. Trexler (294-0897 or trexler@iastate.edu). For my study I am interested in discovering your perceptions of university courses and instructors, and what you expect from Hort/AgEdS 282X. You will be interviewed at the beginning of the semester and again at the end. Each interview should last approximately 30-45 minutes. Interviews will be tape recorded and transcribed.

Your decision whether or not to participate in this study will not affect your grade for the course in any way. All responses will be kept confidential; your responses will not be shared with the instructors for 282X or anyone else. In order to insure confidentiality, your real name will not be used in the transcriptions or in the presentation of data for my thesis. Nothing will identify you to the public.

The interviews will begin as soon as possible at a time and place that is mutually agreeable. You will not receive compensation for your participation in this study; your participation is completely voluntary. You are free to inquire about the study at any time. You may discontinue at any time during the project without penalty or prejudice. All data will then be returned to you.

Thank you for your participation in this research project.

Sincerely,

Lynnette Davis, Research Assistant
Agricultural Education and Studies
ladavis22@hotmail.com
515-432-1796
CONSENT FORM

I am a Master’s student in Agricultural Education and Studies gathering research for my thesis. My major professor is Cary J. Trexler, (294-0879 or trexler@iastate.edu).

For this study, I will personally interview you in January of 2002 at a time that is convenient for you. You will be asked about your personal experiences with regard to university courses and instructors. The interview should last approximately 30 to 45 minutes. No questions will be asked that pose any risk or discomfort to you.

All records will be kept confidential; only I will have access to the information obtained from this study. Your responses will not be shared with the instructors for this course, and your participation will not affect your grades for the course in any way. Pseudonyms will be used for people and places in the transcripts and my thesis; nothing will identify you to the public.

You will not receive compensation for your participation in this study; your participation is completely voluntary. You are free to inquire about the study at any time. You may discontinue at any time during the project without penalty or prejudice. All data will then be returned to you.

I have read the above form and understand the information. I consent to participate in this research study.

Responser Date

Reseacher Date

_____ I grant permission for the interview to be tape recorded to insure accuracy.

_____ I grant permission for the researcher to quote me directly in her thesis.
Appendix C

INTERVIEW QUESTIONS
Interview Questions

First interview (beginning of semester):

1. Why did you enroll in Hort/AgEdS 282X?
2. What do you expect to learn in Hort/AgEdS 282X?
3. What was your favorite/least favorite university class so far and why?
4. Describe a "typical" university course of about 25 students.
5. Define "lecture" in an academic setting.
6. What is your idea of what should take place in a "lab."
7. What do you like about "typical" university courses?
8. How might "typical" courses be improved?
9. Describe the ideal university instructor.
10. Have you ever had an ideal instructor?
11. What should the role of the instructor be in your learning?
12. What is the role of the learner in university classes? Does it differ from high school?
13. What do you think is the "best" way to learn about horticulture?
14. What is the best way to learn how to be a teacher?

Second interview (midway through semester)

1. Generally, how is the class going so far?
2. What is going well for you in class?
3. Is there anything about the class that might be hindering your learning?
4. Are you learning more, less, or about the same amount of useful information in Hort/AgEdS 282 than you learned in other university courses?
5. Is the course meeting your expectations so far?
6. Any other comments you wish to make about the course?

Third interview (end of semester):

1. What did you learn in Hort/AgEdS 282X?
2. Would you recommend this class to others? Why or why not?
3. What was your favorite/least favorite university class so far and why?
4. Describe a "typical" university course of about 25 students.
5. What do you like about "typical" university courses?
6. How might "typical" courses be improved?
7. Describe the ideal university instructor.
8. Have you ever had an ideal instructor?
9. What should the role of the instructor be in your learning?
10. What is the role of the learner in university classes? Does it differ from high school?
11. What do you think is the "best" way to learn about horticulture?
12. What is the best way to learn how to be a teacher?
Appendix D

WRITTEN QUESTIONNAIRE
Questionnaire for Lynnette's Research

Name ____________________________

I am interested in finding out how your learning is progressing so far in class. Please take a few minutes to answer these questions. I would like you to put your name on the paper in the event that I would like to ask you more about your responses. Your responses will remain confidential; *I will be the only person who sees your name associated with your answers.* Your participation in filling out this questionnaire is voluntary and will not affect your grade for the course.

1. What most helped my learning in this class was:

2. What most hindered my learning in this class was:

3. What are your feelings about the teaching approaches used?

4. What would you most like to say about the instructors' effectiveness or ineffectiveness as teachers?

5. What would you most like to say about your experience as a student in this course?
References


Dunn, R. & Dunn, K. (1979). Learning styles/teaching styles: Should they...can they...be matched? Educational Leadership 36: 238-244.


*Cognitive structures and conceptual change*. Orlando, FL: Academic Press.


