Learning Modalities of Agriculture Students at a Two-Year Agricultural College

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Abstract

Learning styles and preferences have been of interest to educators for decades. The more we know about the learning styles of those we teach, the better able we are to design curriculum and deliver instruction. Educators should recognize that students differ in learning styles, and we should use that information to better facilitate learning. This study sought to understand the preferred modes of learning of a group of students attending Abraham Baldwin Agricultural College (ABAC) for the purpose of improving teaching and learning at that institution. Learning style preferences of two-year agricultural students at ABAC are described in this study. The Lewin-Kolb Learning Style Inventory (LSI) was used to assess students' preferred learning style. Using demographic data, students were divided into groups based on college major, gender, age, and class standing. Comparisons of LSI scores among these groups were made and found. Differences between these groups and implications for teaching in agriculture are discussed.

Introduction

Understanding how a student learns and helping students understand how to learn is a major requisite for any successful educational program (Gardner, 1993). This understanding can be especially important for Colleges of Agriculture since agriculture students may have different learning preferences than students in less scientifically-oriented learning situations (Dyer and Osborne, 1996).

Bawden (1986) suggested that as a result of our genetic make-up, our past experiences (especially our educational experiences), and the relative development of different parts of our brain, each of us develops a particular style of learning. Just as instructors have a particular style of learning, so do students. Instructors tend to develop courses using learning experiences that are perceived as valid and valuable for facilitating learning. Instructors and students also value particular educational experiences based on preferred ways of learning.

Understanding how students learn is of utmost importance (Gardner, 1993). Research has demonstrated that learning style preferences and the consideration educators give to learning styles are closely related to learner achievement, dropout rates, and student satisfaction with instruction (Price, 1983; Cox et al., 1988; Rollins, 1990; Rollins and Scanlon, 1991; Cano and Garton, 1994). Diagnosing learning styles may help educators understand student assumptions about teaching and learning and their behavior in instructional situations.

Theoretical Framework

The theoretical framework for this study is positioned around David Kolb's (1984) Experiential Learning theory. This theory deals with questions of learning and individual development as well as learning style. Kolb believes that learning is contextual, meaning that a person's reality is constantly being defined by a person's experience. This reality is only stable when there is no change between a person and his or her environment.

Kolb believes that learning is a four-stage-process, but this series of four stages spirals upward, with multiple series of the four-stage-process being repeated--a helix of learning. In simple terms, the

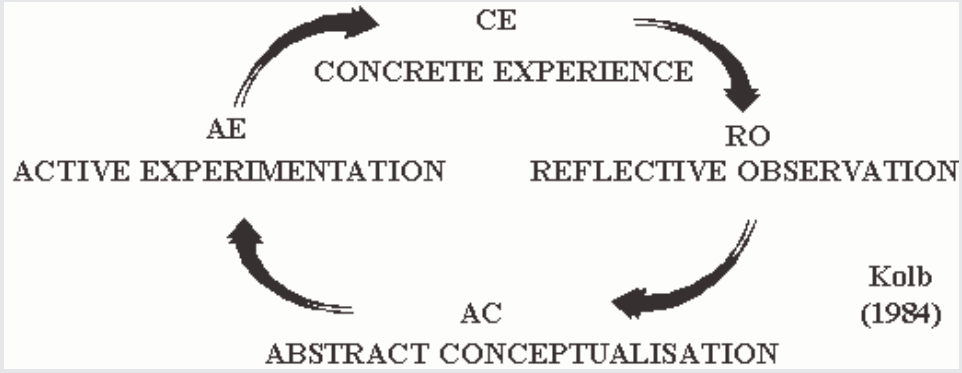

Figure 1. Diagram of Kolb's four step *Experiential Learning* process.

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four-stage process includes learners having experiences, reflecting on them, deducing generalizations about the experience, and then using them as a guide to further action. Once this process has been completed, the cycle begins again. Kolb called these stages concrete experience, reflective observation, abstract conceptualization, and active experimentation (See Figure 1).

Kolb defines these stages as follows:

1. Concrete Experience (CE) is an experience-based approach to learning. People with concrete experience preferences focus on being directly involved in experiences, dealing with human situations personally, are good at relating to others, and are good intuitive decision makers. They emphasize feeling as opposed to thinking, have an intuitive artistic approach as opposed to a systematic, scientific approach to problems, and have an open-minded approach to life.

2. Reflective Observation (RO) is an observation-based (watching), impartial approach to learning. Individuals with reflective observation style focus on understanding meanings of ideas by observing and describing them. They emphasize understanding as opposed to practical application, are concerned with truth or how things happen as opposed to what will work, and emphasize reflection over action. They appreciate different points of view; rely on their feelings to form opinions, and value patience, impartiality, and thoughtful judgment.

3. Abstract Conceptualization (AC) is a conceptually based, analytical approach to learning. People with an orientation toward abstract conceptualization focus on logic, ideas, precision, and concepts, emphasizing thinking and analyzing ideas, and not feeling. A person with this orientation is good at systematic planning, manipulating abstract symbols, and has a scientific as opposed to an artistic approach to problems.

4. Active Experimentation (AE) is an action-based approach to learning. An orientation toward active experimentation includes practical applications, looking for what works and doing, as opposed to reflective understanding and observing. These people enjoy and are good at getting things accomplished, are willing to take some risk to achieve objectives, and value having influence on the environment around them (Kolb and Smith, 1986).

Purpose and Objectives of the Study

The purpose of this study was to achieve a better understanding of learning style differences of ABAC students so that agricultural faculty could improve curriculum, instruction, and learning at their institution. Specific objectives of this study include:

1. Describe the demographics of agricultural students at ABAC,
2. Describe selected majors of agricultural students at ABAC,
3. Describe ABAC agricultural students' learning preferences for each Kolb Learning Style category, and
4. Compare students based on learning modality, major selection, and other demographic variables.

Materials and Methods

Researchers sought to explore and describe the two-year agricultural students at ABAC using a causal comparative design. In the spring of 2003, a convenience sample of 100 agriculture students enrolled in the Agricultural Seminar course was selected to participate in the study. One hundred students (100% response rate) responded to the study.

In addition to a simple demographic survey, which determined respondents' age, class, sex, and major, Kolb and Smith's (1986) Learning Style Inventory (LSI) was the primary instrument used to determine students' preferred mode of learning.

The LSI is a twelve-item self-description questionnaire. Each item consists of four words that describe how the individual learns, and the respondent is asked to rank order each set of four words. One word in each item corresponds to one of the four learning abilities--concrete experience, reflective observation, abstract conceptualization, and active experimentation (i.e. “feeling, watching, thinking, doing”). The scoring system provides a measurement of an individual's relative emphasis on each of the four learning abilities. Reliability estimates (Cronbach's Alpha) for the four basic orientations of the LSI range from 0.73 to 0.88.

Researchers distributed and collected data through the Office of the Chair of the Division of Agriculture and Forest Resources at ABAC. After students consented to participation, they were given the questionnaire and asked to return the survey to their instructors. Verbal and written reminders and phone calls were used as follow-up methods to achieve the 100% response rate.

Data were analyzed using the General Linear Models (GLM) of the Statistical Analysis System (SAS). Descriptive statistics of central tendency and variability were computed to summarize the data regarding the learning styles of ABAC agricultural students. Mean separation was performed using Duncan's Multiple Range Test. Only one student classified himself or herself as a Wildlife major, therefore that subject was added to the Animal Science group. Similarly, four agricultural business majors were combined with the agricultural education students to create the Agricultural Education/Business group. Agricultural Mechanics/Technology majors represented group one. Horticulture majors represented group two. Animal Science and Wildlife majors represented group three, and Agricultural Education/Business students represented group four.

Results and Discussion

Students were mostly sophomore, male, and between the ages of 18 and 21. ABAC is a two-year institution, therefore 24 (24 %) students were classified as freshmen, 62 (62%) students were classified as sophomore, and another 14 (14%) classified themselves as transfer students. The sample consisted of 72 (72%) male students and 27 (27%) female students, and one student who did not indicate his or her gender. The disproportional gender breakdown causes this sample of students to differ from many four-year institutions that have a majority of females majoring in agriculture. Eighty-one (81%) of the students were between the ages of 18 and 21, while all students were 34 ears of age or less (Table 1).

The agriculture major of participants was identified in order to determine if particular types of major preferred a particular type of learning. Thirty-three (33%) of the students were Animal Science/Wildlife majors, 28 (28%) were Agricultural Mechanics/Technology majors, 18 (18%) were Horticulture majors, 14 (14%) classified themselves as Agricultural Education and/or Agricultural Business majors, and seven (7%) declared "Other" as their major.

Students recorded the highest scores (M = 38.28, SD = 7.39) for the Active Experimentation (AE) mode of learning (Table 2). In fact AE was the most preferred mode of learning for each major by quite a large margin (Table 3). Recall that AE learning focuses on practical applications and "what works," as opposed to reflective understanding and observing. Usually, students with this learning preference enjoy learning and are good at getting things accomplished, are willing to take some risks to achieve objectives, and value having influence on the environment around them. AE learners value getting things done and seeing the results. High AE individuals learn best when they can engage in activities such as projects, homework, or small group discussions.

Although scores were noticeably lower than AE, the second most preferred mode of learning for all majors were recorded for the Reflective Observation (RO) mode of learning (M = 30.50, SD = 5.93). High scoring RO individuals rely heavily on careful observation in making judgments and prefer learning situations such as lectures that allow them to take the role of impartial objective learners. The learning modes of Abstract Conceptualization (AC) (M = 26.99, SD = 5.16) and Concrete Experience (CE) (M = 24.04, SD = 6.24) were least preferred by the participants.

Agriculture majors of participants were analyzed in relation to the learning modality scores. No significant differences were found for Abstract Experimentation, Reflective Observation, or Abstract Conceptualization. However, Horticulture (M = 26.22), Agricultural Education/ Business (M = 24.79), and Animal Science/Wildlife (M = 24.15) students scored significantly (P=.05) higher on the learning modality of Concrete Experience (CE) than Agricultural Mechanics/Technology (M = 21.46) students. This finding indicates that Agricultural Mechanics/Technology students may not learn best when human interaction is involved or when intuitive decisions have to be made, but they may be more likely to read directions and think situations through on their own than other majors.

Lastly, significant differences were found between male and female agriculture students at ABAC. Males were more likely to prefer Abstract Conceptualization than females, $F(1) = 2.89$, $p = .05$, but females were more likely to prefer Concrete Experimentation, $F(1) = 3.10$, $p < .05$.

Table 1. Demographic frequencies of ABAC agriculture students

Variable	f	%
Class		
Freshman	24	24
Sophomore	62	62
Transfer students	14	14
Gender		
Male	72	72
Female	27	27
Unmarked	1	1
Age		
18	4	4
19	21	21
20	32	32
21	24	24
22	6	6
23	4	4
24	4	4
25	2	2
27	1	1
31	1	1
34	1	1

Table 2. Mean learning modalities of ABAC agriculture students (N = 100)

Learning Mode	M	SD
Abstract Experimentation	38.28	7.39
Reflective Observation	30.50	5.93
Abstract Conceptualization	26.99	5.16
Concrete Experience	24.04	6.24

Table 3. Mean learning modalities by major and gender (N = 100)

	n	M	SD
Agricultural Mechanics/Technology			
Abstract Experimentation	28	40.32	4.94
Reflective Observation	28	30.75	3.89
Abstract Conceptualization	28	27.04	4.12
Concrete Experience	28	21.46	3.82
Gender	28	1.00	0.00
Horticulture			
Abstract Experimentation	18	36.28	8.18
Reflective Observation	18	31.89	6.09
Concrete Experience	18	26.22	4.35
Abstract Conceptualization	18	25.67	5.39
Gender	18	1.22	0.43
Animal Science/Wildlife			
Abstract Experimentation	33	37.61	8.17
Reflective Observation	33	30.46	6.96
Abstract Conceptualization	33	27.09	5.68
Concrete Experience	33	24.15	7.38
Gender	33	1.58	0.56
Ag Business/Ag Education			
Abstract Experimentation	14	37.21	9.15
Reflective Observation	14	28.93	6.22
Abstract Conceptualization	14	26.43	5.53
Concrete Experience	14	24.79	7.36
Gender	14	1.36	0.50
Other			
Abstract Experimentation	7	40.57	4.72
Abstract Conceptualization	7	29.29	4.68
Reflective Observation	7	29.29	7.14
Concrete Experience	7	26.71	7.76
Gender	7	1.14	0.38

Summary and Implications

The strongest learning modality among ABAC students was Active Experimentation, meaning that students are looking for practical applications and for "what works." Faculty should teach with and use "hands-on" projects, homework, and small group discussions in their teaching, as AE students tend to enjoy having an influence on the environment around them. Specifically, these students need faculty to adopt a philosophy of action-based learning (Kolb and Smith, 1986). Instructors should strive to provide for experiences upon introducing new content so that AE students will have occurrences from which to learn. Experiences such as these allows AE student needs, such as finishing goals, taking risks, and influencing others, to be met.

Interestingly, Reflective Observation was the next highest modality of ABAC students. Perhaps lecture does not deserve the bad rap it has received, for RO learners value learning situations where they have the time and privacy to think and process information. In other words, many ABAC students also learn best by understanding the big picture. Teaching faculty need to capitalize on this innate understanding for truth or how things happen, as opposed to what will work for today, and begin to emphasize reflection over action in their teaching program. Changes in technology and the information overload of the 21st century make understanding concepts more important than what works for today.

Abstract Conceptualization was not a preferred mode of learning among many ABAC students. Abstract conceptualization focuses on logic, ideas, precision, and concepts, emphasizing thinking and analyzing ideas. Groups such as the National Research Council (1988) and the National FFA Organization (National FFA Task Force on Leadership, Personal Growth, and Career Success, 2002) espouse that this type of learning is also an important part of learning in agriculture. Teaching faculty should structure and design course activities (i.e., undergraduate research opportunities) that promote intellectual curiosity and the truth-seeking ability of students (Ricketts and Rudd, 2005).

Concrete experience was the least preferred way of learning among all the reported ABAC majors, and Agricultural Mechanics/Technology majors scored significantly lower than all other majors on the Concrete Experience mode of learning. ABAC students, and especially Ag Mech/Tech majors may not enjoy group learning and team building exercises. Feelings and human interaction are not as important to their ability to gain and retain new information. Agricultural Mechanics/Technology faculty should not eliminate these types of activities from the curriculum, but they should dispense an extra measure of encouragement and motivation when these assignments are given. These majors would appreciate activities that allow students to solve

problems and work on their own, and faculty should attempt to incorporate these types of activities.

This study also determined that male students preferred Abstract Conceptualization more than female students, meaning that males in this study were more likely than females to learn by focusing on logic, ideas, precision, and concepts. Female students preferred the Concrete Experience modality of learning more than male students; meaning female learners in this study were more likely to learn by being directly involved in experiences and by working with others to construct knowledge. To address this finding and others in this study faculty should enthusiastically teach with a variety of methods that keep students engaged. Faculty should also be organized and provide for clarity and student opportunity for success (Rosenshine and Furst, 1973).

Future research should expand on this study by identifying the learning preferences of agricultural students at a sampling of two-year colleges. Future investigation should also include four-year institutions in the query in order to include junior and senior level students and a more representative gender populace. Lastly, future research should identify the learning styles and predominate teaching methods of agricultural teaching faculty in relation to the learning styles and learning preferences of their students.

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