What is your learning style preference? A look at Industrial Technology and Agriculture Students

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Abstract

This study examined the learning style preferences of sophomore, junior, and senior African American college students majoring in Agriculture, and Industrial Technology at a historically black university. The Productivity Environmental Preference Survey (PEPS) which was used to examine the learning style preferences. ANOVA was used to ascertain what learning styles preferences were and to determine if there were any differences between the learning preferences in the chosen major in the study. The alpha level was set at .05. The findings revealed for the majors: 1) Industrial Technology majors, preferred light, auditory, time of day, and mobility. 2) Agriculture majors preferred temperature, motivated, persistence responsible/conforming, alone or peers, several ways, and kinesthetic. In addition to the findings, the learning style preferences of the students were different for industrial technology and agriculture.

Introduction

Enrollment of students of color in colleges and universities in the United States is currently increasing. According to the American Council on Education (2003), total student of color enrollment at U.S. colleges and universities increased 122 percent form 1980 to 2001. The shift in the demographics of our nation and schools will have an impact on the way that faculty will teach at colleges and universities (Fazarro, 2001).

Learning style research provides a comprehensive understanding of how students especially students of color, learn and how faculty can improve the teaching through instruction. Many of our current traditional instructional approaches are ineffective for addressing the learning needs of today's college students (Weimer, 2003). Students of color bring different learning preferences to the classroom that faculty may not adequately address. Anderson (1995) maintains that the understanding of learning styles among diverse cultures becomes more critical when applied to diverse populations in the classroom along with the success and failures of learning environments in higher education.

Learning Style Theory

According to Keefe (1987) the term "learning style" contains three dimensions: 1) cognitive, 2) affective, and 3) physiological. The three dimensions helped create a theoretical framework that guides learning styles on a 'holistic' approach is based on the Dunn and Dunn Learning Style Model. The development of the Dunn and Dunn Learning Style Model originated from two theories: Cognitive Style Theory and Brain Lateralization Theory. This model utilizes five stimuli: environmental, emotional, sociological, physiology, and psychological. The 21 elements are grouped into five stimuli: environmental (*sound, light, temperature, design*), emotional (*motivation, persistence, responsibility, structure*) sociological

(*self, pair, peers, team, adult, varied*), physiology (*perceptual, intake, time mobility*) and psychological/cognitive processing (*global, analytic, hemisphericity, impulsive/reflective*). The Dunn and Dunn Learning Style Model does not determine the individual's learning style based on culture, rather the learning style that is presently used in the classroom.

Need for Research

Learning styles of Agriculture students have been addressed with a cognitive style instrument which examines the field dependent & independent preference of the students. Torres and Cano (1994) using the Group Embedded Figures Test, investigated the preferred learning styles of agriculture students enrolled in agriculture by gender and by academic major. Torres and Cano (1999) found that agriculture student learning styles differed by gender and by agriculture major. Learning styles have been shown to have relationships to student retention, student – instructor interaction, and influence academic disciplinary action (Cano and Porter, 1997; Cano, 1999). However, the literature reveals little regarding the learning style preferences of students of color. Relatively little research has been conducted regarding the learning styles of students of color in Agriculture at the postsecondary institutions. Furthermore, these studies examine only the cognitive dimension, not the "holistic approach" to learning or interacting with the classroom environment, and do not examine the possible uniqueness of learning styles of students of color.

Anderson and Adams (1992) indicated that increasingly more and more attention is being focused on the need to meet the challenges of increasing diversity at the university level. They contend that:

> One of the most significant challenges that university instructors face is to be tolerant and perceptive enough to recognize learning differences among their students. Many instructors do not realize that students vary in the way they process and understand information. The notion that

> students' cognitive skills are identical at the collegiate level [suggests] arrogance and elitism by sanctioning on group's style of learning while discrediting the style of others.

Other learning style models, such as the Dunn and Dunn Learning Style Model should be used to examine different ways of students learn holistically to maximize research body of knowledge.

Purpose and Research Questions

The purpose of this paper is to bring awareness to faculty of the research conducted in learning styles at the post-secondary level and to inform faculty of the different learning patterns that exist in the classroom. As mentioned earlier in the article, there will be an increase of students of color entering college classrooms. This type of research is needed to assist faculty in re-thinking how instruction is delivered in the classroom. There were two research questions which drives the study: 1) What are the learning style preferences of Agriculture, Industrial Technology? 2) Are there any differences between the learning style preferences for the majors Industrial Technology and Agriculture?

Methodology

Sample

This study utilizes a quasi-experimental design. Convenience sampling method was used to obtain data 119 from sophomore, junior, and senior African American students in the areas of Agriculture (n=59), and Industrial Technology (n=60) from a population of 173. Freshmen were excluded because they are not "acclimated" into the chosen disciplines.

Instrumentation

The instrument used in the study was the Productivity Environmental Preference Survey (PEPS) which is based on the Dunn and Dunn Learning Style Model. The PEPS contain 20 elements/learning styles which is used the asses ones learning style. There are 100 statement items in the survey. This instrument uses a Likert-type scale to assess the *how students like to learn* not *why* (Price, 1996). The standard scores ranges from 20 to 80. Students who score 40 or less were "least preferred" or 60 or more were "most preferred", indicated that students prefer a style that benefits them when they learn or study. The PEPS instrument had reliability scores were 90 percent equal or greater than .60 (Price, 1996). In addition, the instrument's validity is acceptable based on countless studies (Policy Center on the First Year of College, 2003).

Statistical Analysis

The statistically analysis used for this study was the ANOVA was used to determine the learning style preferences of students in Industrial Technology and Agriculture majors. Statistical Package for Social Sciences v.11 (SPSS®) was used to run the analyses. Before the analyses were run, normality was checked to determine if the normality and other assumptions were violated. This is to ensure that the statistical output was correct.

Findings

The first research question asked in the study "what are the learning style preferences of Industrial Technology and Agriculture?" The results were significant at an alpha level of .05. Industrial technology students preferred auditory time of day and mobility.

Agriculture majors preferred, temperature, persistence, responsible (conforming), alone or peers, *several* ways, and kinesthetic. See table 1 for the statistical results of the learning style preferences by major.

Table 1
ANOVA and group means for Learning Styles Preferences Based on Major

Major/Learning Style Preference	**df**	**F**	**M**
Industrial Technology			
Light	58	6.123	48.40
Auditory	58	4.523	54.63
Time of Day	58	4.963	44.15
Mobility	58	4.508	53.90
Agriculture			
Temperature	57	5.840	50.88
Motivated	57	5.800	48.73
Persistence	57	4.136	52.95
Responsible(Conforming)	57	8.085	44.00
Alone or Peers	57	7.522	56.00
Several Ways	57	14.884***	43.76
Kinesthetic	57	6.288	50.20

Note: ***p<.000

The second question asked, "If there were differences between the learning style preferences of the students in Industrial Technology and Agriculture?" There differences between the learning style preferences based on major for the students in Industrial Technology and Agriculture preferred four learning style preferences: light, auditory, time of day, and mobility Agriculture majors preferred five learning style preferences: temperature, motivated, responsible, learn alone/peer, several ways, and kinesthetic. See Table 2 for comparisons of preferences.

Table 2.
Learning Style Preference by Major

Agriculture	Industrial Technology
Temperature	Light
Motivated	Auditory
Responsible	Time of Day
Learn Alone/Peer	Mobility
Several Ways	
Kinesthetic	

Conclusions

The use of convenience sampling is limited to generalization of the population (McMillan & Schumacher, 2001). Caution should be considered when making conclusions to other populations.

This study examined in learning styles of students in the majors which are "hands-on" type programs which are essential for technological growth in this country. According to table 1, the learning styles that were significant in both majors fell in the middle of the standard score of 40 and 60. The scores are interpreted as learning styles are important to students when it depends on the learning environment or other factors to may influence that particular learning style(s) (Price, 1996). In table 2, surprisingly, there no common learning style preferences in both majors, even though the disciplines are "hands-on."

The findings may provide instructors in vocational/technology education fields some awareness of what needs to be done to improve instruction. The learning style preferences were derived for each of the majors, has implications for instruction and the learning environment that should be considered. These are the learning styles students preferred in the selected majors and what instructors should do (PEPS, 1996):

1. ***Auditory***- If none are 60 or more, use several multisensory resources such as computers, videotapes, television.
2. ***Temperature***- For a score of 60 or more provides adequate warmth, enclosures, screens, supplemental heaters. For a score of 40 ore less, provide adequate air-conditioning, placement in cooler areas.
3. ***Motivated***-For a score of 60 or more, encourage use of self designed objectives, procedures and evaluation before the instructor or supervisor assesses effort. For a score of 40 or less, provide short-term, uncomplicated assignments that require frequent discussions with instructor or supervisor.
4. ***Persistent***- For a score of 60 or more, design long-term assignments, provide supervision and assistance when only necessary. For a score of 40 or less, provide short-term, limited assignments; check progress frequently, experiment with short-range motivators and reinforcement.
5. ***Responsible(Conforming)-***For standard score of 60 or more, begin by designing short-term assignments; as these are successfully completed, gradually increase their length and scope; challenge the individual at the level of his or her functional ability or slightly beyond. For standard score of 40 or less, design short-term, limited assignments with only single or dual goals; provide acceptable options and frequent checking by the instructor or supervisor; directions should be simple and responsible colleagues should be placed in the immediate environment and on the same projects.
6. ***Structure***-For a score of 60 or more, be precise about every aspect of the assignment; permit no options; use clearly stated objectives in a simple form; list and itemize as

many things as possible. For a score 40 or less, establish clearly stated objectives but permit choice of resources, procedures, timelines, reporting, check, etc.

7. ***Learning Alone/Peer-Oriented***-For a score 40 or less, encourage use of self-designed objectives, procedures and evaluations before supervisor assess effort. For a score of 60 or more, pair or team this person with other people who complement his/her sociological characteristics.
8. ***Several Ways***-For a score of 60 or more, provide opportunities for a variety of working patterns for the same student. For a score of 40 or less, allow the student to work in a sociological pattern most preferred …Utilize patterns and routines.
9. ***Kinesthetic***-If none are 60 or more, use several multisensory resources such as computers, videotapes, sound filmstrips.
10. ***Light***-For a score of 60 or more, place students near a window or bright. For a score of 40 or less, create workspaces under indirect or subdued lighting.
11. ***Time of Day***-For a score of 60 or more, permit scheduling of difficult tasks in the morning. For a score of 40 or less, permit scheduling of difficult tasks in the evening.
12. ***Mobility***- For a score of 60 or more, provide frequent breaks, assignments that require movement to different locations and schedules that build mobility in the work/learning pattern. For a score 40 or less, provide a stationary desk or work station where most of the individual's responsibilities can be completed.

Discussion

The PEPS instrument asses how and not why students prefer the learning style preference for each discipline, this study is beneficial to the body of knowledge in improving

instruction/learning environment in the area of vocational education/technology education. These two disciplines are traditionally taking a "hands-on" approach to learn. The reasons for the different learning style preferences in Industrial Technology and Agriculture, and may be the different social structure, instruction, and the teaching style(s) that exist for each of the disciplines. Kolb's research concludes that learning styles/patterns may be influenced or shape the "culture" of the discipline in undergraduate education. Kolb (1981) argues that as"…a result of our hereditary equipment, our particular past life experiences, and the demands of our present environment, most of us developing learning styles emphasize some learning abilities over others" (p.237). This research does provide some leads to if the students select majors based on the learning preferences, which needs to be addressed in a future study.

Faculty must recognize the changing environment in the 21st century classroom to enhance their understanding about how improve "flexible" instruction with designing a 'inclusive' learning environment to successfully teach to students of color as well as to different cultural and socio-economic backgrounds. Furthermore, Knowles (1970) stresses the importance of the learning climate, which is applicable in enhancing and developing a "conducive" environment. This environment must meet the need of all students regardless of color, culture and socio-economic status.

Need for future Research

To further enhance the body of knowledge of learning style research, here are some suggestions for future research:

1. Further study is needed to investigate the learning style preferences of Asian, Latino, and Native American in other vocational /technology fields.

2. Further study is needed to investigate why students chose Industrial Technology and Agriculture discipline based on the way students prefer to learn.
3. Specific research is needed to examine the teaching styles of Industrial Technology and Agriculture faculty to determine if their teaching styles align with students' learning style preferences.

References

American Council on Education (2003). *20th Edition- Minorities in higher education annual status report.* Washington, D.C.

Anderson, J. A. (1995). Toward a framework for matching teaching and learning styles for diverse populations. In R. R. Sims & S. J. Sims (Eds.), *The importance of learning styles: Understanding the implications for learning, course design, and education.* (pp.69-78). Connecticut: Greenwood Press.

Anderson, J. A. & Adams, M. (1992). Acknowledging the learning styles of diverse student populations: Implications for instructional design. *New Directions for Teaching and Learning, 49,* 19-31.

Bevard College, (2003). *Learning Style Assessment Instruments*. Retrieved January 11, 2005, from the Policy Center on the First Year of College Web site: http:// www.brevard.edu/fyc/resources/learningstyles.htm

Cano, J. (1999). The relationship between learning style, academic major, and academic performance of college students. *Journal of Agricultural Education*, *40*(1), 30-7.

Cano, J., and Porter, T. L. (1997). The relationship between learning styles, academic major, and academic performance of college of agriculture students. *Proceedings of the 24th Annual National Agricultural Education Research Meeting*, (pp.373-380). Las Vegas, NV.

Fazarro, D.E. (2001). A factor analysis of the preferred learning styles of industrial technology and engineering undergraduate students at North Carolina Agriculture & Technical State University and Iowa State University (Unpublished doctoral, Iowa State University).

Knowles, M. (1970). *The modern practice of adult education: Andragogy versus pedagogy.* New York: Associated Press.

Keefe, J. W. (1987). *Learning style: Theory and practice.* Reston, Virginia: National Association of Secondary Schools Principals.

Kolb, D. (1981). Learning styles and disciplinary differences. In Arthur W. Chickering and Associates (Eds.). *The modern American college: Responding to the new realities of diverse students and a changing society.* (pp. 232-252) San Francisco: Jossey-Bass.

McMillan, J. H. & Schumacher, S. (2001). *Research in education: A conceptual introduction.* (5th ed.). New York: Longman.

Price, G. E. (1996). *Productivity environmental preference survey: An inventory for the identification of individuals adult learning style preferences in a working or learning environment.* Lawrence, KS: Price Systems Inc.

Torres, R. M., and Cano, J. (1994). Learning styles of students in a college of agriculture. *Journal of Agricultural Education*, *35*(4), 6-10.

Weimer, M. (2003). Focus on learning, transform teaching. *Change*, *34*(4), 45-52.