THE RELATIONSHIP BETWEEN LEARNING STYLE, ACADEMIC MAJOR, AND ACADEMIC PERFORMANCE OF COLLEGE STUDENTS

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Abstract

The purpose of this study was to describe the learning style of 1994 incomingfreshmen students enrolled in the College of Food Agricultural, and Environmental Sciences at The Ohio State University. The study investigated the relationships between learning style, academic performance, and selected student characteristics. Results of the study indicated that the 1994 enteringfreshmen tended to lean towards the field-independent learning style. The students in the study who were field-independent, in 1995, majored in Agribusiness and Applied Economics, Animal Sciences, Horticulture, or Agronomy. In 1996, the field-independent students majored in Agricultural Education, Animal Sciences, Food Science, or Horticulture. The field-dependent students, in 1995, majored in Agricultural Communication, Agricultural Education, and Food Science. In 1996, the field-dependent students majored in Agribusiness and Applied Economics, Agricultural Communication, Agricultural Systems Management, Agronomy, and Construction Systems Management. The results of the current study also indicated that field-dependent students were more likely to receive disciplinary action from the College due to a lower grade point average, than were field-independent students. Also, the findings indicated that as learning style score moved from dependent to independent, there were corresponding increases in ACT scores and cumulative grade point average. The evidence in the current study is clear to indicate that leaning style does positively influence academic achievement in the College of Food, Agricultural, and Environmental Science.

Introduction

There is evidence to suggest that students differ greatly in how they learn (Dunn & Dunn, 1979; Bargar, Bargar, & Cano, 1994). Anderson and Adams (cited in Torres, 1993) stated 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" (p. 19).

Research suggests that learning style is an important factor in students' achievement (Cano & Garton, 1994). White (1970) confirmed there was a pattern of intellectual change which occurred in college students. Like the early childhood stages of development as described by Piaget, Perry (1970) indicated that a basic progression in ways of thinking for a student during the college experience existed. Perry (1970) further stated that this basic progression influenced the instructor and/or advisor of the student to seek alternative ways to teach and advise. White (1970) and Lyons (1984) encouraged teachers who hoped to nurture the importance of basic progression in the development of intellectual change, to practice their art with responsive versatility in an effort to retain more students.

In past studies, there have been noted correlations in how a learner learns, measured by learning style, and how much a learner learns, measured by cumulative grade point average (Torres, 1993; Torres & Cano, 1993). Other findings indicated that students who were more independent in their thinking, were more successful in higher education (Porter & Cano,

1996). What implications does this hold for those students who are more dependent in their thinking? Are dependent thinking students as successful as their counterparts within higher education? For those educators who communicate, interact, and teach students daily, the knowledge gained from learning about the relationship between learning style and academic performance can only help in the academic success of students.

Purpose And Objectives

The purpose of this study was to describe the learning style and academic performance of 1994 incoming freshmen students enrolled in the College of Food, Agricultural, and Environmental Sciences at The Ohio State University. The study investigated the relationships between learning style, academic performance, and selected student characteristics. The specific objectives of the study were to:

1. describe the students' learning style within majors;
2. describe the relationship between students' learning style and academic performance; and,
3. describe the relationship between students' learning style and academic disciplinary action taken by the College.

Procedures

Population and Sample

The population for this longitudinal descriptive-correlational study was a census of all 1994 incoming freshmen students enrolled in the College of Food, Agricultural, and Environmental Sciences at The Ohio State University (N=187). The accessible population was those students attending a freshman orientation class in October, 1994. Results of the study were generalized only to the accessible sample (n=178).

Instrumentation

The Group Embedded Figures Test (GEFT) and the Myers Briggs Type Indicator (MBTI), both valid and reliable instruments, were used to identify student learning style. Data collection for learning style occurred in October, 1994. For the purpose of the study, a person's learning style was measured for field-dependence or field-independence using the GEFT. The GEFT score of incoming freshmen was dichotomized as either field-dependent (0 - 11) or field-independent (12 - 18) using the GEFT's national mean (11.3) as the separation point between field-dependence and field-independence (Witkin, Oltman, Raskin, & Karp, 1971).

The MBTI (Form G), a 126 question forced-choice instrument designed to measure the constructs identified by Jung's theory of personality type (Myers& Briggs, 1962), was also administered to determine learning style. The instrument is designed to elicit the subject's cognitive-perceptual process preference on four dichotomous scales (Extraversion/Introversion; Sensing/Intuition; Thinking/Feeling; Judging/Perceiving). The scales of perception (Sensing/Intuition) and judgement (Thinking/Feeling) combined, assess learning style (Bargar, Bargar, & Cano, 1994; Myers, 1990). Thus, the combinations of Sensing/Feeling (SF), Intuition/Feeling (NF), Sensing/Thinking (ST), and Intuition/Thinking (NT) were used to describe learning style, with Feeling (F) being very consistent with field-dependence, and Thinking (T) being very consistent with field-independence (Bargar, Bargar, & Cano, 1994; Myers, 1990).

Data Collection

The GEFT and MBTI were administered by the researcher who is qualified to administer the two instruments following the established guidelines. The GEFT and MBTI were hand

scored by the researcher who administered the instruments. After the GEFT and MBTI were administered, the primary source for research data was the College of Food, Agricultural, and Environmental Sciences student database. Using a fact sheet, student data were collected from the student data base for major, ACT score, cumulative grade point average (CGPA), and disciplinary action taken. Academic disciplinary action occurs when a student grade point average (GPA) falls below 2.00. The primary data (from the student data base) were collected during the month of October, 1995, and October, 1996. Disciplinary action data was treated as nominal data.

Data Analysis

Data were analyzed using SPSS/PC for Windows software program. Davis' (197 1) convention was used to describe relationships. Pearson Product Moment correlation coefficients were calculated between learning style and ACT scores, learning style and CGPA , and learning style and Disciplinary Action. An alpha level of *.05* was set *apriori.*

Results/Findings

An analysis of student learning style, using frequencies and percentages, by academic major (Table 1) indicated that 99 (56%) of the 1994 incoming freshmen were field-independent (ST/NT). Meanwhile, 79 (44%) of the 1994 incoming freshmen were field dependent (SN/NF). As this is a panel study (a sample is selected from the population at the initial data collection point and the same sample is used at each data collection point) (Miller, 1997), the percentage for field-dependence (SN/NF) and field-independence (ST/NT) cannot change. In 1995, the 1994 incoming freshmen who were field-independent (ST/NT) most likely majored in Agribusiness and Applied Economics, Agronomy, Animal Sciences, or Horticulture. In 1996, the 1994 incoming freshmen who were field-independent (ST/NT) most likely majored in Agricultural Education, Animal Sciences, Food Science, or Horticulture. The field-dependent (SF/NF) students in 1995 were most likely to major in Agricultural Systems Management, Construction Systems Management, Other (includes majors outside the College of Food, Agriculture, and Environmental Sciences, or the subject is no longer a student at Ohio State University), or Undecided. In 1996, the students who were field-dependent (SF/NF) most likely majored in Agribusiness and Applied Economics, Agricultural Communication, Agricultural Systems Management, Agronomy, Construction Systems Management, Other, or Undecided (Table 1).

The mean CGPA was 2.45 and was used to determine the two CGPA categories. Using frequencies and percentages, the CGPA score for academic performance indicated that in 1995, a total of 100 (56%) incoming freshmen (n= 178) were above a 2.46 CGPA and 78 (44%) were at or below a 2.45 CGPA. Of those students above the 2.46 CGPA, 66 (67%) were field-independent (ST/NT) and 34 (43%) were field dependent (SF/NF) in 1995. Meanwhile, the 1995 findings indicated that of those students at or below a 2.45 CGPA, 33 (33%) were field-independent (ST/NT) and 45 (57%) were field-dependent (SN/NF) (Table 2).

Using frequencies and percentages, the CGPA score for academic performance indicated that in 1996, a total of 105 (59%) 1994 incoming freshmen (n= 178) were above a 2.46 CGPA and 73 (41%) were at or below a 2.45 CGPA. Of those students above the 2.46 CGPA, 75 (71%) were field-independent (ST/NT) and 30 (29%) were field dependent (SF/NF) in 1996. Meanwhile, the 1996 findings indicated that of those students at or below a 2.45 CGPA, 22 (30%) were field-independent (ST/NT) and 5 1 (70%) were field-dependent (SF/NF) (Table 2). The CGPA results for both data collection years indicated that the majority of field dependent(SF/NF) students were at or below a 2.45 CGPA, whereas, the majority of field

Table 1. Learning Style and Academic Major of Students (n=178)

	1995				1996			
	Dependent SF/NF		Independent ST/NT		Dependent SF/NF		Independent ST/NT	
	n	%	n	%	n	%	n	%
Agribusiness & Applied Economics	12	46	14	54	14	52	13	48
Agricultural Communications	7	50	7	50	10	67	5	33
Agricultural Education	9	50	9	50	7	32	15	68
Agricultural Systems Management	2	67	1	33	2	67	1	33
Agronomy	6	46	7	54	8	57	6	43
Animal Sciences	25	36	45	64	18	34	43	66
Construction Systems Management	2	67	1	33	3	75	1	25
Food Science	1	50	1	50	0	0	3	100
Horticulture	5	45	6	55	5	38	8	62
Other	1	100	0	0	9	75	3	25
Undecided	9	53	8	47	3	75	1	25
Total	79	44	99	56	79	44	99	56

Table 2. Learning Style and College Grade Point Average (CGPA) (n=178)

	1995				1996			
College grade point average	Dependent SF/NF		Independent ST/NT		Dependent SF/NF		Independent ST/NT	
	n	%	n	%	n	%	n	%
2.46 - 4.00	34	34	66	66	30	29	75	71
0.00 - 2.45	45	58	33	42	51	70	22	30
Total	79	44	99	56	81	46	97	54

Note. Mean grade point average = 2.45

independent (ST/NT) students were above a 2.45 CGPA. The relationship between learning style and ACT scores were all positive and significant, ranging from low (r = .25) for ACT Reading, to substantial (r = .51) for ACT Math in the 1995 data collection year. As the ACT scores and learning style are constant, changes should not occur within the study. However, the CGPA is not constant, and therefore subject to change from year to year. In 1995, learning style correlated low, positive, and significant with CGPA (r = .24) (Table 3). In 1996, the relationship between

learning style and CGPA was significant, moderate, and positive (r = .30) (Table 3). The positive relationships indicated that as learning style score increased (the more field-independent and ST/ NT), an increase was noted in ACT score and CGPA.

Table 3. Relationship Between Learning Stvle JGEFT and MBTI) and ACT Score (n=178)

	1995	1996
ACT score		
English	.34*	.34*
Math	.51*	.51*
Reading	.25*	.25*
Science	.38*	.38*
Composite	.42*	.42*
CGPA	.24*	.30*

*p < .05

The correlations indicated low to negligible relationships between learning style and academic disciplinary action taken by the College for both data collection years (Table 4). A low positive relationship resulted between learning style and disciplinary action of none (1995, r =. 14; 1996, r = .16). All other disciplinary actions (special action probation, probation, warning, and dismissal) were low to negligible and negative, ranging from r = ▪ .02 to r = -.23. The negative relationships indicated that as academic disciplinary action increased, learning style score decreased (the more field-dependent and SF/NF). The positive relationship indicated that as learning style score increased (the more field-independent and ST/NT), academic disciplinary action decreased. A significant relationship (p < .05) between learning style and all disciplinary action taken by the College was indicated for both data collection years.

Table 4. Relationship Between Learning Stvle JGEFT and MBTI) and Academic Discinlinarv Actions (n= 178)

	1995	1996
None	.14*	.16*
Special action probation	-.02*	-.07*
Probation	-.17*	-.23*
Warning	-.07*	-. 10"
Dismissal	-.03*	-.21*

*p < .05

Conclusions/Recommendations/ Implications

The learning style of the 1994 incoming freshmen enrolled in the College of Food, Agricultural, and Environmental Sciences at Ohio State University, for the most part, were field-independent (ST/NT), but not in any practical terms. The mean GEFT score for the 1994 entering freshman was 11.6 which minimally exceeded the national mean of 11.3 (Witkin, Oltman, Raskin, & Karp, 197 1).

Freshmen students in the study who were field-independent (ST/NT), in 1995, majored in Agribusiness and Applied Economics, Animal Sciences, Horticulture, or Agronomy. Furthermore, the results indicated that for the majors of Agricultural Communication, Agricultural Education, and Food Science, the students were evenly split between field-dependent (SF/NF) and field-independent (ST/NT). The students majoring in Agricultural Systems Management and Construction Systems Management were field-dependent (SF/NF).

In 1996, however, the students who were field-independent (ST/NT) majored in Agricultural Education, Animal Sciences, Food Science, or Horticulture. The 1996 results also indicated that the students who were field-dependent (ST/NT) majored in Agribusiness and Applied Economics, Agricultural Communication, Agricultural Systems Management, Agronomy, Construction Systems

Management, Other, and Undecided.

The results of the current study were similar to the results in a former study conducted by Torres (1993) which noted that the field-independent (ST/NT) senior students majored in Animal Sciences, Horticulture, Agricultural Education, and Food Science. Torres (1993) also concluded that the senior students who were majoring in Agribusiness and Applied Economics and Agronomy were field-independent (ST/NT), Which the current study does not support the findings by Torres (1993).

If the trend continues between academic major and learning style, it is conceivable to conclude that those students who are attracted to "hard" science majors are field-independent (ST/NT) students, and those attracted to "social" sciences are field-dependent (SF/NF) students. However, one puzzling point to note is that Agronomy, generally considered a "hard" science, in the 1995 data of the current study and the Torres (1993) study, was favored by field-independent (ST/NT) students. However, in the 1996 data of the current study, Agronomy was favored by field-dependent (SF/NF) students. More investigation is warranted to discover the reasons leading to the inconsistency.

Furthermore, the students who majored in "Other," for both field-dependents (SF/NF) and field-independents (ST/NT), increased at an alarming rate. The students in the "Other" category have either switched to majors outside the College, or are no longer students in the University, either by their choice or the College's choice. What is more alarming, is that the greatest proportion of the increase came from field-dependent (SF/NF) students. What ever the case, more investigation is warranted to determine the "real" reasons the students changed majors or left the university.

Therefore, it is recommended that a qualitative study focusing on those students from the current study who changed majors from and within the College of Food, Agricultural and Environmental Sciences, or who are no longer students at Ohio State University be initiated immediately. The purpose of the qualitative study would be to determine the factors that influenced the student's decision to make a change, to learn if those factors are related to learning style (GEFT or MBTI), and to learn if the identified factors can be addressed by the College.

The results of the current study suggested field-dependent (SF/NF) students were more likely to receive disciplinary action from the College due to a lower CGPA, than were field-independent (ST/NT) students. The findings also indicated that as learning style score moved from dependent (SF/NF) to independent (ST/NT), there were corresponding increases in ACT scores and CGPA. Since ACT score and CGPA are used as indicators of academic success, the findings tend to imply that field-independent (ST/NT) students will be more successful in higher education.

Furthermore, based on the fact that as learning style moves from dependent (SF/NF) to independent (ST/NT), CGPA and ACT scores increase, the findings in the current study also support the notion that as learning style moves from independent (ST/NT) to dependent (SF/NF), the disciplinary action taken by the College increases. Again, the findings imply that the structure utilized in higher education is more supportive offield-independent (ST/NT) students.

From previous research, it has long been known that CGPA and ACT scores were positively related; that is, as CGPA increased, ACT scores increased. The current study confirmed the previous research. In other studies by Kroon (1986), Hodges (1986), and Giannitti (1988), it was learned that academic achievement was positively influenced by learning style (the more field-independent and ST/NT, the greater the CGPA). The evidence in the current study is clear to indicate, that learning style does positively

influence academic achievement in the College of Food, Agricultural, and Environmental Sciences. What could be the variables supporting this phenomenon? Is it the teaching conducted by the instructors?

Based on the premise that teachers teach the way they learn (Dunn & Dunn, 1979), a recommendation for further research would be to determine the learning style (GEFT and MBTI) of faculty. This information could be used to see whether learning style influences methods of teaching students and also the relationship which may occur between the teachers' learning style and the students' academic achievement. In addition, a thorough investigation is warranted to determine the "actual" teaching methods utilized by the faculty in the College of Food, Agricultural, and Environmental Sciences at Ohio State University, and the impact or influence the teaching methods have on academic achievement.

In addition, the researcher recommends identifying students' learning styles (GEFT and MBTI) early in their academic career. The purpose of identifying the students' learning style early in their academic career would be to alert the student to his or her potential academic weaknesses and to teach them mechanisms by which to cope and/or adapt their learning. It is also recommended that the College, knowing that field-dependent (SF/NF) students are more likely to need academic assistance, should establish a "drop-in" lab for all students. The lab's function would be to provide tutoring, academic counseling, and seminars on surviving in college which would enhance their educational experience. By determining students' learning styles (GEFT and MBTI) and helping educators communicate, interact, and teach more effectively to those styles, the academic success of students may be enhanced.

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