

# Learning Style Differences Among NACTA Conference Participants

Matt R. Raven

Dept. of Agricultural Education and Experimental Statistics, Mississippi State University  
Mississippi State, MS 39762-9731

M. Susie Whittington

The Pennsylvania State University, University Park, PA 16802-2603

Tina Day

Dept. of Agricultural Education and Experimental Statistics, Mississippi State University  
Mississippi State, MS 39762-9731

## Abstract

Of the 82 NACTA conference participants in 1995, 78 were men and 48 were full professors. The mean age of participants was 51. The mean Group Embedded Figures Test (GEFT) score of 10.6 for agricultural faculty varied from the national norm of 11.4. The mean GEFT score of 9.4 for agricultural faculty in the education discipline area was the lowest of the groups of participants.

Data showed that 56% (46) of the agricultural faculty were field-dependent learners and 44% (36) were field-independent learners. Three of the four female agricultural faculty were field-independent. Nearly 60% (34) of faculty who held a primary teaching appointment were field-dependent. Nearly two-thirds (30) of the full professors preferred the field-dependent learning style while the assistant professors preferred the field-independent learning style.

There was a substantial negative correlation (-.37) between agricultural faculty members' GEFT scores and age. There was a slight positive correlation (.18) between agricultural faculty members' GEFT scores and percentage of appointment designated for research.

## Introduction

"Learning style" refers to the predominant and preferred manner in which individuals take-in, retain, process, and recall information. "...Learning style is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. It represents both inherited characteristics and environmental influences" (Keefe and Monk, 1986, p.1-2). Learning style is evidenced through observed individual differences in the student-teacher relationship.

What can be said about individual differences? Studies indicate that individuals have the capability to learn and teach; but not in the same exact ways (Gregorc, 1979). Dunn and Dunn (1979) stated that not only do students learn in

different ways, but certain students succeed only through selected methods. For example, field-dependent learners (defined by Witkin, 1971) will tend to succeed given "cooperative learning" methods while field-independent learners prefer more teacher-controlled methods. Research by Entwistle and Ramsden (1983) confirmed relationships between approach to teaching and student outcomes. Their research suggests that field-dependent students learn best through social interaction and dialogue exchange while field-independent learners tend to achieve higher scores through more systematic lecture-type approaches.

Cox and Zamudio (1993) stated that, as teachers, we invest a great deal of time thinking about and preparing for what we teach. Likewise, they suggested, we should spend an equal amount of time thinking about and preparing for how we teach.

## Purpose and Research Objectives

The purpose of this study was to determine, compare, and contrast the learning styles of agricultural faculty who were attending a conference-wide learning styles seminar held at the 41st Annual National Association for Colleges and Teachers of Agriculture (NACTA) Conference held at The Pennsylvania State University, 1995. The following research objectives guided this investigation:

1. To describe the personal characteristics (gender, age, appointment, academic rank, discipline area, type of institution) of conference participants who were agricultural faculty at four-year agricultural degree granting institutions.
2. To determine the preferred learning style of conference participants as measured by the Group Embedded Figures Test (GEFT, described in the methods section).

3. To compare and contrast conference participants' learning styles by selected personal characteristics (gender, teaching appointment, discipline area, rank, institutional type -- land-grant vs. non-land grant).
4. To determine the correlation between agriculture faculty members' GEFT scores and selected personal characteristics (percentage of instructional, research, service, administrative appointment, age).

### Definitions

In considering learning styles, there has been extensive study of the influence the surrounding field has on a person's perception of items within the field. Witkin et al. (1971) described the influence as follows: Individuals with a field-dependent learning style tend to have a social orientation and best learn material with more explicit instruction in problem-solving strategies. Field-independent learners, however, view the world more analytically. Field-independent learners rely on self-defined goals and self-structured situations.

### Methods

The population (N = 82) for this descriptive-correlational study was faculty from four-year agricultural degree granting institutions in North America who were directly involved with undergraduate instruction and were attending a conference-wide learning styles seminar held at the 41st Annual NACTA Conference.

The GEFT (a standardized, nationally normed instrument) was administered during the seminar and was used in determining the preferred learning style of the subjects as either field-dependent or field-independent (Witkin et al., 1971). The instrument contains 18 spatial items designed for participants to find simple objects embedded within complex objects; scores upon completion of the instrument range from 0 - 18. Witkin described participants as field-dependent when they scored 0 to 11.4 (the national norm for the instrument) and he described participants as field-independent when their scores ranged from 11.4 to 18.

An additional questionnaire, developed by the researchers, was used to collect demographics of participants. A panel of experts comprised of agricultural education faculty with expertise in teaching methods and evaluation established face and content validity of the questionnaire. The demographics questionnaire was designed to collect age, gender, university of employment, highest degree, area in which degree was granted, percentage of appointment (in

terms of instruction, research, service, and administration), and academic rank.

Faculty were categorized into one of five areas based upon the discipline in which they had earned their highest degree. Faculty with a degree in agricultural economics or agricultural business were placed into the agricultural economics category. Faculty with a degree in agricultural education, occupational education, or other education-related degree were placed into the educational category. Faculty with degrees in agronomy, horticulture, plant pathology, or weed science, were placed in the plant-related category. Faculty with a terminal degree in animal science, dairy science, animal genetics, or poultry science were placed in the animal-related category. Finally, faculty with their highest degree in soil science, agricultural chemistry, or agricultural engineering were placed into the agricultural/physical science related category.

Agricultural faculty were also categorized based upon their teaching appointment percentage (extension appointments were considered nonformal teaching appointments and were categorized with teaching appointments). Faculty with an appointment of 50% or more were placed in the category "teaching primary responsibility". Faculty with less than a 50% instructional appointment were placed in the category "teaching secondary responsibility".

Since the study was a census, it was not appropriate to report inferential statistics. The researchers hand-scored all instruments and analyzed the data using SPSS.

### Findings

The mean age of participants was 50.9 (sd=8.9). Of the 82 conference participants, 78 were men.

Over half (48) of the participants were full professors (Table 1). Seventy percent of agricultural faculty had appointments with teaching as their primary responsibility. Seventy-eight percent of associate professors had an appointment with teaching as their primary responsibility.

The mean GEFT score for agricultural faculty was 10.6 (Table 2). The mean GEFT score for agricultural faculty in the education discipline area was 9.4.

Examination of Table 3 reveals that nearly 60% (34) of faculty who held a primary teaching appointment were field-dependent. Almost half (12) of the faculty with an appointment where teaching is a secondary responsibility were field-dependent.

The majority (57%) of agricultural faculty in the animal-related discipline area tended to prefer the field-independent learning style (Table 4). Half of the faculty in the agricultural/physical science area preferred the field-independent learning style. Agricultural faculty in the agricultural economics, education, and plant-related discipline areas tended to prefer the field-dependent learning style. Two-

**Table 1. Instructional appointment of agricultural faculty attending conference by rank (N = 82).**

Rank	Teaching Primary Responsibility		Teaching Secondary Responsibility		Total	
	n	%	n	%	n	%
Professor	30	62.5	18	37.5	48	100.0
Assoc. Professor	21	77.8	6	22.2	27	100.0
Assist. Professor	2	66.7	1	33.3	3	100.0
Instructor	4	100.0	0	0.0	4	100.0
Total	57	69.5	25	30.5	82	100.0

**Table 2. Group Embedded Figure Test scores of agricultural faculty attending conference by discipline Area (N = 82).**

Discipline Area	Teaching Primary Responsibility		Teaching Secondary Responsibility		Total	
	Mean	SD	Mean	SD	Mean	SD
Ag Econ	10.3	5.3	9.0	5.7	9.8	5.3
Education	9.0	5.2	11.0	5.2	9.4	5.2
Plant Related	11.1	2.7	9.25	5.5	10.7	3.4
Animal Related	11.0	2.2	12.3	4.6	11.6	3.4
Ag Physical Sci	11.9	4.2	11.8	6.1	11.9	4.7
Total	10.5	4.2	10.7	5.2	10.6	4.5

**Table 3. Learning styles of participants by teaching appointment (N = 82).**

Teaching Responsibility	Field Dependent		Field Independent		Total	
	n	%	n	%	n	%
Primary	34	59.6	23	40.4	57	100.0
Secondary	12	48.0	13	52.0	25	100.0
Total	46	56.1	36	43.9	82	100.0

**Table 4. Learning styles of agricultural faculty attending conference by discipline area (N = 82).**

Discipline Area	Field Dependent		Field Independent		Total	
	n	%	n	%	n	%
Ag Econ	9	60.0	6	40.0	15	100.0
Education	14	66.7	7	33.3	21	100.0
Plant Related	10	55.6	8	44.4	18	100.0
Animal Related	6	42.9	8	57.1	14	100.0
Ag Physical Sci	7	50.0	7	50.0	14	100.0
Total	46	56.1	36	43.9	82	100.0

thirds of the faculty in the education discipline area preferred the field-dependent learning style.

There was little difference in the learning style of agricultural faculty at land-grant and non-land-grant schools. Approximately 56% of the faculty at either type of institution preferred the field-dependent learning style.

Nearly two-thirds (30) of the full professors preferred the field-dependent learning style while all assistant professors preferred the field-independent learning style. Approximately half (14) of the associate professors preferred the field-independent learning style.

#### Relationships

There was a substantial negative correlation (-.37) between agricultural faculty members' GEFT scores and age. The older the faculty member, the greater the tendency to prefer the field-dependent learning style. There was a slight positive correlation (.18) between agricultural faculty members' GEFT scores and percentage of appointment designated for research. Faculty with a higher percentage of their appointment for research had a slight tendency to have a higher GEFT score.

### Conclusions/Discussions

Agricultural faculty attending a conference-wide session at the 41st NACTA Conference at the Pennsylvania State University varied in their learning styles as indicated by the range in scores collected using the GEFT learning styles instrument. Overall, participants tended to prefer a field-dependent learning style with faculty holding a degree in the educational discipline area being the most field-dependent of participants.

Additionally, the learning styles of conference participants differed depending on their academic area. Agricultural faculty in the animal-related discipline area tended to be more field-independent than those faculty in the social science areas of agricultural economics and education.

Female NACTA Conference participants scored above the national norm on the GEFT indicating a more field-independent learning style.

### Implications And/Or Recommendations

Agricultural faculty, representing a large number of universities from the United States and Canada, left the NACTA Conference with an awareness of student individual differences regarding learning styles. Therefore, these agricultural faculty now have a knowledge base from which they can further explore learning styles in their teaching.

Previous learning styles studies in agriculture that concentrated on pre-service agricultural educators (Cano et

al., 1992; Raven and Shelhamer, 1993; Whittington and Raven, 1995) consistently found that pre-service agricultural educators tended to be field-independent. Faculty in this study were field-dependent. This mismatch of student/teacher styles has been a concern in learning styles research (Keefe and Monk, 1986). What are the implications of this dichotomy? Further research is needed to determine more precisely the learning styles of agricultural faculty across the country and the predominate styles of the students they teach.

Witkin et al. (1971) found that as one ages one tends to become more field-dependent. NACTA Conference participants were field-dependent. However, participants also tended to be older, more experienced faculty which could partially explain the more field-dependent scores.

Granted there were only four women in this study, but the question continues to surface in learning styles research--Why do females in agriculture tend to score above the national norm for females? Are these the females who have broken down an initial barrier to entering the profession? These variables need to be studied longitudinally so that trends and associations can be found.

#### What should agricultural faculty do?

As educators we know that the students seated in our classrooms at the beginning of a new term are all different from each other and different from us. It is wrong for us to ignore these differences. Since studies indicate that a combination of field-independent learners with a field-dependent teacher (or other combination of styles) may not be the most beneficial for the highest levels of achievement to occur, this study reveals a problem -- learners in agricultural education (as revealed in earlier studies) and teachers in agricultural disciplines are mismatched with regard to achieving at the highest possible levels. Since it is financially problematic for universities to match learning styles of students to teachers, the best solution is for professors to be aware of their own style, the styles of their learners, and the wealth of methodologies and techniques available which can be utilized to "tap-into" the learning styles of all learners in the classroom. By improving the match between the learning style of the student and the techniques utilized by the instructor, there potentially exists possibilities to increase the achievement level of students and thus renew satisfaction in teaching for professors.

### Literature Cited

- Cano, J., B.L. Garton and M.R. Raven. 1992. Learning styles, teaching styles and personality styles of preservice teachers of agricultural education. *Journal of Agricultural Education* 33(1):46-52.

- Cox, D. E. and E. Zamudio.1993. Student learning styles and effective teaching. *The Agricultural Education Magazine* 66(5): 5-6. 22.
- Dunn, R. S. and K.J. Dunn.1979. Learning styles/teaching styles: should they...can they...be matched? *Educational Leadership* 36: 238-244.
- Entwistle, N. J. and P. Ramsden.1983. Understanding student learning. New York: Nichols Publishing Company.
- Gregorc, A. F.1979. Learning/teaching styles: potent forces behind them. *Educational Leadership* 36: 234-237.
- Keefe, J. W. and J.S. Monk.1986. Learning style profile. Reston, VA: National Association of Secondary School Principals.
- Raven, M. R. and V. Shelhamer.1993. The relationship between students' ability to demonstrate the problem solving approach to teaching in a methods class and their learning styles. Proceedings of the Twentieth Annual National Agricultural Education Research Meeting, 89-97, Nashville, TN.
- Whittington, M. S. and M. Raven.1995. A comparison of learning styles, teaching styles and personality types of student teachers. *Journal of Agricultural Education* 36(4): 10-17.
- Witkin, H. A., P.K. Oltman, E. Raskin, and S.A. Karp, S.A. 1971. Group Embedded Figures Test manual. Consulting Psychologist Press, Inc.: Palo Alto, CA.

# NACTA - L

## STAY IN TOUCH !

NACTA-L is an electronic discussion group for the Executive committee and the general membership. Let us know how we can improve teaching in agricultural, environmental, natural and life sciences.

Just E-mail a message to:

**NACTA-REQUEST@UPLATT.EDU**

Once you've joined you can post to the NACTA-L by sending messages to:

**NACTA-L@UWPLATT.EDU**

**USE IT OFTEN !!!**

## Revitalizing an Introductory Laboratory Course in Environmental Science --Taking Student Opinion Into Account

James J. Riley<sup>1</sup>, Environmental Research Laboratory, Soil, Water and Environmental Science Department, University of Arizona, Tucson, AZ 85706

*"I actually have learned a lot, but have not found any of it relevant to my personal life."  
Student comment about the introductory environmental laboratory course, Spring 1996*

### Abstract

Survey results from students in four sections of an introductory environmental science laboratory indicated that 1) the lab topics were acceptable but did not develop practical problem-solving skills applicable to the real world, 2) labs failed to develop a spirit of inquiry, 3) an informal professional relationship with the instructor was achieved, 4) the addition of teaching assistants would be desirable, and 5) pre-lab worksheets improved understanding of lab exercises. Based on these results, lab exercises are being revised to make them more inquiry-based and better related to students lives. A program to use undergraduate teaching aides, preceptors, is planned for the Fall semester.

<sup>1</sup> Senior Research Assistant

### Introduction

I just completed my second semester of teaching Introduction to Environmental Science Laboratory: Land, Water and Air, at the University of Arizona (UA), which has been offered for 6 years by the Soil, Water and Environmental Science (SWES) Department. It is a one unit general education laboratory science course primarily for non-majors in environmental science. Student enrollment is composed of undergraduates, mostly freshmen and sophomores. Four sections of the laboratory are offered weekly, each with an enrollment of 15-25 students. SWES faculty teach most of the lab sections. Occasionally, one or more of the labs are taught by departmental graduate teaching assistants.