

# The Relationship Between Agriculture Preservice Teachers' Learning Styles and Performance in a Methods of Teaching Agriculture Course

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Researchers (Witkin, 1973; Gregorc, 1979; Garger & Guild, 1984) have suggested that learning style was an important factor in students' academic achievement, how students learn and teachers teach, and student-teacher interaction. Dunn and Dunn (1979) asserted that "teachers teach the way they learned" (p. 241), which has been supported by other researchers (Witkin, 1973; Gregorc, 1979; Avery, 1985). Koppleman (1980) suggested that investigations conducted on the relationship between a person's learning style and the manner in which he/she teaches were insufficient.

Learning style describes the manner in which learners sort and process information. The most extensively studied learning style has been the field-dependence/independence dimension, which has produced the broadest applications to educational problems (Witkin, Moore, Goodenough, & Cox, 1977). In the field-dependence/independence learning style dimension, a person can be categorized as preferring either a field-dependent or field-independent learning style (Witkin, 1973).

Research (Witkin, 1973) has shown that a person whose mode of perception was strongly dominated by the surrounding field was said to be leaning toward a field-dependent learning style. Individuals with a field-dependent learning style tend to perceive the world globally, finding it more difficult to solve problems (Ronning, McCurdy, & Ballinger, 1984), and finding it more difficult to teach using a problem-solving approach (Witkin et al., 1977).

In contrast, a person who perceives items as more or less separate from the surrounding field is leaning more toward a field-independent learning style (Witkin, 1973). Field-independent learners view the world more analytically, find it easier to

solve problems (Ronning, McCurdy, Ballinger, 1984), and more than likely teach using a problem-solving or inquiry approach (Witkin et al., 1977; Koppleman, 1980). Persons leaning toward a field-independent learning style have shown an interest in teaching agriculture (Witkin et al., 1977).

The agricultural education profession has promoted the problem-solving approach as the teaching approach to use in teaching secondary agriculture students (Martin, 1982; American Association for Agricultural Education, Preparation of Professionals for Agricultural Education, 1991). Crunkilton (1988) stated that ". . . problem solving, both as a method of teaching and as a skill that students need, is more critical today than it was years ago" (p. 8). Teacher educators in agriculture have long advocated the use of the problem-solving approach to teaching (Stewart, 1950; Binkley & Tulloch, 1981; Crunkilton & Krebs, 1982; Newcomb, McCracken & Warmbrod, 1986; Phipps & Osborne, 1988). Teacher educators across subject matter disciplines support teaching teachers how to teach using an inquiry-oriented (problem-solving) approach to teaching (Association of Teacher Educators, Commission on the Education of Teachers, 1991).

In addition, Mosston (1972), in discussing problem-solving, stated that "problem solving as a teaching style requires problem solving as a learning style" (p. 166). Subsequently, with the emphasis placed on teaching utilizing the problem-solving approach, do all teachers of agriculture possess the characteristics to teach utilizing the problem-solving approach? Research is needed in the agricultural education profession that identifies the relationship which may exist between preservice teachers' preferred learning styles and their ability to teach utilizing the problem-solving approach.

## Purpose and Research Questions

The purpose of the study was to determine the relationship between preservice agriculture teachers' preferred learning styles and their performance in Methods of Teaching Agriculture, a course emphasizing the problem-solving approach to teaching. To guide the study, the following research questions were developed:

What was the preferred learning style of preservice teachers of agriculture as measured by the Group Embedded Figures Test?

What was the relationship between preservice teachers' preferred learning styles and their performance in the Methods of Teaching Agriculture microteaching laboratory?

What was the relationship between preservice teachers' preferred learning styles and their final course score in Methods of Teaching Agriculture?

## Procedures

### Population and Sample

The study was descriptive and relational in nature. The target population for the study was preservice teachers majoring in Agricultural Education at The Ohio State University. The accessible sample included 29 female and 53 male (n=82) preservice teachers of agriculture enrolled in Methods of Teaching Agriculture during the academic years 1990, 1991, and 1992. Results of the study were generalizable only to the accessible sample.

### Instrumentation

The Group Embedded Figures Test (GEFT) (Oltman, Raskin, & Witkin, 1971) was administered to determine the preferred learning style of the subjects as either field-dependent or field-independent. Subjects who scored greater than the national mean (11.4) (Witkin, Oltman, Raskin, & Karp, 1971) were considered to be leaning toward the field-independent learning style while subjects scoring less than the national mean were considered to be learning toward the field-dependent learning style. The GEFT is considered

a standardized instrument and has been tested for validity and reliability (Spearman Brown Prophecy formula = .82) (Witkin, Oltman, Raskin, & Karp, 1971).

### Data Collection and Analysis

The GEFT was administered by one of the researchers during the university academic years 1990, 1991, and 1992. Preservice teachers' performance in Methods of Teaching Agriculture was measured utilizing two criteria: microteaching laboratory average score and final course score. The microteaching laboratory was conducted utilizing the problem-solving approach to teaching, as outlined by Newcomb, McCracken, and Warmbrod (1986). Preservice teachers were required to demonstrate the problem-solving approach to teaching during seven microteachings. Preservice teachers' final course score encompassed microteaching average score, quizzes given during the course, a complete unit plan, and final exam score, all of which were based on the problem-solving approach to teaching.

The GEFT was hand scored by one of the researchers. Microteaching lessons were evaluated and scored by the microteaching laboratory instructor. The microteaching evaluations were based on the preservice teachers' ability to demonstrate the problem-solving approach to teaching. In addition, preservice teachers' overall teaching performance was used as an evaluation criteria. Reliability of the microteaching evaluations was dependent upon the instructor's consistency in evaluating the preservice teachers' performance in the microteaching laboratory. A single instructor was utilized during the three years of the study, therefore intra-rater reliability was an issue. In a similar study (Garton, 1993), the microteaching laboratory instructor had an intra-rater reliability coefficient of .90.

The aggregate data were analyzed using the SPSS/PC+ program. Pearson Product correlation coefficients were calculated between GEFT scores and performance in Methods of Teaching Agriculture and were interpreted utilizing Davis' (1971) descriptors.

## Results

An analysis of the GEFT scores indicated

that 41 percent (34) of the preservice teachers tended toward the field-dependent learning style and 59 percent (48) leaned toward the field-independent learning style (Table 1). A gender analysis revealed that 45 percent (13) of the females preferred the field-dependent and 55 percent (16) preferred the field-independent learning style, while 40 percent (21) of the males preferred the field-dependent and 60 percent (32) the field-independent learning style. The mean score on the GEFT was 11.9 which exceeded the national norm of 11.4 (Witkink, Oltman, Raskin, & Karp, 1997). The preservice teachers' GEFT scores ranged from the minimum possible score of zero to the maximum possible score of 18, with a standard deviation of 4.6.

Table 1. Preferred Learning Styles of Preservice Teachers of Agriculture (n=82)

Gender	Field-dependence		Field-independence	
	N	%	N	%
Females	21	44.8	16	55.2
Males		39.6	32	60.4
Total	34	41.5	48	58.5

Mean = 11.9  
SD = 4.6  
Range=0 to 18

The second research question sought to describe the relationship between preservice teachers' preferred learning styles and their performance in the Methods of Teaching Agriculture microteaching laboratory. A low positive relationship ( $r=.20$ ) was found between learning style and microteaching laboratory average score utilizing the problem-solving approach (Table 2.) The results suggested that the more field-independent a preservice teacher's learning style, the greater his/her score in microteaching utilizing the problem-solving approach to teaching.

The third research question sought to describe the relationship between the preservice teachers' preferred learning styles and their final course scores in Methods of Teaching Agriculture. The relationship between preservice teachers' preferred learning style and final course score were low and positive ( $r=.21$ ) (Table 2). The association indicated that preservice teachers preferring a field-independent learning style tended

Table 2. Relationship Between Learning Style and Performance in Methods of Teaching Agriculture Course (n=82)

	Learning Style	Microteaching Laboratory	Final Course Score
Learning Style (GEFT)	1.00	.20	.21
Microteaching Laboratory		1.00	.90
Final Course Score			1.00
<b>Microteaching Laboratory;</b>		<b>Final Course Score:</b>	
Mean = 87.8"		Mean = 89.7	
SD = 4.8		SD = 4.3	
Range = 72.9-94.7		Range = 76.3-95.5	

to have greater final scores in the Methods of Teaching Agriculture course.

### Conclusions and Implications

Preservice teachers of agriculture in the current study differed in their preferred learning styles. Approximately 60 percent of the agriculture preservice teachers preferred a field-independent learning style. The agriculture preservice teachers' preferred learning styles ranged from an extreme field-dependent learning style to an extreme field-independent learning style. The finding implies that teacher educators must be cognizant of the learning style differences of preservice teachers of agriculture when planning for instruction.

It was concluded that a low positive relationship existed between preservice teachers' preferred learning styles and performance in the Methods of Teaching Agriculture microteaching laboratory and final course score. Preservice teachers preferring a field-independent learning style achieved greater scores than preservice teachers preferring a field-dependent learning style in the microteaching laboratory and final course score. The findings imply that preservice teachers of agriculture possessing a field-independent learning style appeared to be more adapted at teaching utilizing the problem-solving approach.

The findings are congruent with research (Witkin, Moore, Goodenough, & Cox, 1977; Koppleman, 1980) that found teachers possessing a field-independent learning style tended to utilize problem-solving more in teaching. The findings

further support Dunn and Dunn's (1979) conclusions that "teachers teach the way they learned" (p. 241). Teachers preferring a field-independent learning style perceive analytically, and find it easier to use problem-solving in teaching. Conversely, teachers preferring a field-dependent learning style perceive globally and find it more difficult to use problem-solving in teaching.

Although the relationships were positive, why were the relationships between the preservice teachers' preferred learning style and performance in a course emphasizing the problem-solving approach to teaching not as strong as suggested by the literature (Witkin et al., 1977; Koppleman, 1980)? A possible explanation is that persons preferring a field-dependent learning style tend to learn better when the subject matter to be learned possesses organization and structure (Witkin, 1973; Gregorc, 1979; Witkin et al., 1977). It is possible that the problem-solving approach to teaching is suited for persons preferring a field-dependent learning style because of its organized and structured way of teaching the subject matter.

Witkin, Moore, Goodenough, and Cox (1977, p. 40) stated that "field-independent persons have shown interest in the teaching of vocational agriculture [sic]" and in the current study 60 percent of the preservice teachers of agriculture preferred a field-independent learning style. Can the interest of persons with field-independent learning styles to teach agriculture be linked to the problem-solving approach?

Teacher educators in agriculture have experienced the lack of use of the problem-solving approach to teaching by teachers of agriculture (Boone & Newcomb, 1990; McKee & Warmbrod, 1992), even though the approach has been emphasized in teacher preparation programs. Could the lack of use of the problem-solving approach be linked to learning style, which is linked to teaching style?

### **Recommendations**

Knowing that preservice teachers of agriculture prefer to learn differently, teacher educators in agriculture must be inclusive of the diverse learning styles found in their classrooms. It is recommended that teacher educators in agriculture consider the learning styles of preservice teachers when planning for instruction

and determine the most effective instructional approaches for the given learning styles.

The preservice teacher curriculum in agricultural education should include instruction on learning styles. Preservice teachers of agriculture should have an understanding of how the learning styles of teachers and students influence and affect the teaching and learning process. In addition, preservice teachers should be taught how to adapt their teaching style to be inclusive of the various learning styles of students.

If field-dependent persons are experiencing difficulty in teaching using the problem-solving approach, then teacher educators in agriculture must seriously consider providing preservice teachers with alternative approaches to teaching agricultural content. Research needs to be conducted to explore what happens, if anything, to field-dependent learners who enter a profession which claims to specialize in problem-solving teaching.

Research on the learning styles of preservice teachers of agriculture should be conducted in an effort to more effectively educate and supervise teachers of agriculture. Research on teachers' learning styles and the pedagogical approaches utilized in their teaching should be expanded to a wider range of agriculture teachers. With additional research on learning styles, teacher educators will be in an improved position to educate and prepare teachers of agriculture.

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