

The Relationship Between Learning and Teaching Styles and Student Performance in a Methods of Teaching Agriculture Course

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Teachers of agriculture are unique in many ways. Teachers of agriculture vary from one another in such characteristics as teaching style and learning style (Cano, Garton, & Raven, 1991). Learning style describes the process that learners use to sort and process information. Learning style is an important factor in several areas including students' academic achievement, how students learn and teachers teach, and student-teacher interaction (Witkin, 1973). Dunn and Dunn (1979) concluded that "teachers teach the way they learned" (p. 241), which has been supported by other researchers (Witkin, 1973; Gregorc, 1979; Avery, 1985). However, Koppleman (1980) suggested that investigations conducted on the relationship between a person's teaching style and learning style are insufficient.

Two of the most widely studied learning styles are field-dependent and field-independent (Witkin, Moore, Goodenough, & Cox, 1977). Research (Witkin, 1973) has shown that a person who's mode of perception is strongly dominated by the surrounding field is said to be leaning towards a field-dependent learning style. Field-dependent learners perceive globally finding it more difficult to solve problems and teach using the problem-solving approach (Witkin et al., 1977). In contrast, a person who perceives items as more or less separate from the surrounding field leans more toward a field-independent learning style (Witkin, 1973). Field-independent learners perceive analytically finding it easier to promote problem-solving, critical thinking, and the inquiry approach to learning (Witkin et al., 1977).

Witkin et al. (1977) stated that "field-independent persons have shown interest in the teaching of vocational agriculture" (p. 40). Koppleman (1980) found that teachers with field-independent learning styles tended to teach using a problem-solving approach.

The problem-solving approach has been promoted by the agricultural education profession as the most effective strategy for teaching agriculture (Osborne and Hamzah, 1989). Teacher educators in agriculture have long advocated using the problem-solving approach in classrooms (Stewart, 1950; Binkley & Tulloch, 1981; Crunkilton & Krebs, 1982; Newcomb, McCracken & Warmbrod, 1986; Phipps & Osborne, 1988). Practitioners have found the problem-solving approach to be an effective way of teaching students the subject content in a practical and meaningful manner. Crunkilton (1988) stated ". . . problem-solving, both as a method to teaching and as a skill that students need, is more critical today than it was years ago" (p. 8). Do all teachers of agriculture possess the characteristics to teach using the problem-solving approach? Do all teachers of agriculture possess the characteristics to teach using the problem-solving approach? To what extent does a preservice teacher's preferred learning style and preferred teaching style influence their ability to teach utilizing the problem-solving approach?

A paucity of research exists in agricultural education which identifies the relationship which may exist between a preservice teacher's learning style and teaching style and their ability to teach utilizing the problem-solving approach. Further research in this area is warranted in order to provide agricultural teacher educators information needed to more effectively train and supervise teachers of agricultural education.

Purpose and Objectives

The purpose of this study was to determine the relationship between preservice agriculture teachers' preferred learning and teaching styles and their performance in Methods of Teaching Agriculture--a course emphasizing the problem-solving approach to teaching.

The following research questions were investigated:

What was the relationship between preservice teachers' preferred learning style and their performance in a methods of teaching agriculture course?

What was the relationship between preservice teachers' preferred teaching style and their performance in a methods of teaching agriculture course?

Methodology

Population and Sample

The population for this correlational study was preservice teachers majoring in agricultural education at The Ohio State University. The sample was preservice teachers enrolled in a methods of teaching agriculture course during the Spring and Autumn Quarters of 1990. The sample (N=25) included seven female and eighteen male students.

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 score above the group mean are considered to be independent learners. In contrast, subjects who score below the group mean are considered to be dependent learners.

The VanTilburg/Heimlich Teaching Style Preference (Heimlich, 1990) was used to ascertain the subjects' preferred teaching style. The VanTilburg/Heimlich instrument defines two domains, sensitivity and inclusion. The sensitivity domain is based on the ability of the teacher to 'sense' the shared characteristics of the group of learners. Inclusion domain is based on the teacher's willingness and ability to utilize techniques to enhance the learning experience based on the groups characteristics.

The GEFT is considered a standardized instrument and has been tested for validity and reliability by the authors of the instrument. The VanTilburg/Heimlich Teaching Style Preference, although not considered a standardized instrument, has been tested for reliability and validity by the authors of the instrument and has been used extensively yielding valid and reliable results.

Data Collection and Analysis

Both research instruments utilized in this study were administered using the Spring and Autumn Quarters of 1990. Data were analyzed utilizing the Statistical Package for the Social Sciences, Personal Computer version (SPSS/PC+). All correlation coefficients were interpreted utilizing Davis' (1971) descriptors.

Preservice teachers' performance in Methods of Teaching Agriculture was measured utilizing three criteria: microteaching laboratory average score, final examination 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 six steps of the problem-solving approach to teaching during seven microteachings. Each microteaching lesson was 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. Preservice teachers' overall teaching performance was also used as an evaluation criteria. The final examination included analyzing a video tape of a teacher utilizing the problem-solving approach to teaching in a natural classroom setting and a written examination over the problem-solving approach. The performance criteria for the video tape portion of the final exam was based on the preservice teachers' ability to evaluate the extent that the video taped teacher incorporated the problem-solving approach in the lesson. Preservice teachers' final course score encompassed microteaching average score, quizzes given during the course, a complete unit plan, and final examination score, all of which were based on the problem-solving approach.

Results

There was a moderate positive relationship ($r=.39$) between learning style as measured by scores on the GEFT and microteaching laboratory average score utilizing the problem-solving approach (Table 1.). The results suggest that the more independent a preservice teacher's learning style, the greater the score in microteaching utilizing the problem-solving approach. The relationship between learning style and final examination score was negative and low ($-.12$) indicating that performance on the final examination was not associated with a preservice teacher's learning style (Table 2). The relationship between learning style and final course score was moderate and positive as indicated by a correlation of .42 (Table 3).

Table 1. Relationship Between Learning Style and Microteaching Laboratory Average Score (N=25)

Microteaching score	Learning style			
	Field-dependence		Field-independence	
	f	%	f	%
78.0 - 80.9	1	9.0	0	0
81.0 - 83.9	0	0	1	7.1
84.0 - 86.9	2	18.2	1	7.1
87.0 - 89.9	4	36.4	1	7.1
90.0 - 92.9	1	9.0	4	28.7
93.0 - 95.9	3	27.4	7	50.0
Total	11	100.0	14	100.0

Pearson's $r = .39$. Note. Correlation coefficient is based on raw scores.

Table 2. Relationship Between Learning Style and Final Examination Score (N=25)

Final Examination Score	Learning style			
	Field-dependence		Field-independence	
	f	%	f	%
77.0 - 79.9	0	0	2	14.3
80.0 - 82.9	1	9.0	0	0
83.0 - 85.9	3	27.3	4	28.6
86.0 - 88.9	2	18.2	2	14.3
89.0 - 91.9	2	18.2	2	14.3
92.0 - 94.9	3	27.3	4	28.6
Total	11	100.0	14	100.0

Pearson's $r = -.12$. Note. Correlation coefficient is based on raw scores.

Table 3. Relationship Between Learning Style and Final Course Score (N=25)

Final course score	Learning style			
	Field-dependence		Field-independence	
	f	%	f	%
81.0 - 83.9	1	9.0	0	0
84.0 - 86.9	0	0	1	7.1
87.0 - 89.9	1	9.0	1	7.1
90.0 - 92.9	6	54.6	2	14.3
93.0 - 95.9	3	27.4	10	71.5
Total	11	100.0	14	100.0

Pearson's $r = .42$. Note. Correlation coefficient is based on raw scores.

The association between learning style and final course score indicated that preservice teachers with a field-independent learning style tended to have higher final scores in the Methods of Teaching Agriculture course.

Research Question Two sought to determine the relationship between teaching style and performance in the Methods of Teaching Agriculture course. Teaching style was defined utilizing the constructs of sensitivity and inclusion. The sensitivity construct was substantial and positively correlated (.53) with microteaching average score (Table 4). The preservice teachers' teaching style was such that possessing the ability to 'sense' the shared characteristics of the learners resulted in greater microteaching average scores. The inclusion construct yielded a negligible and negative correlation coefficient of -.08. The results indicated that preservice teachers inclusion of their students in the lesson was not associated with their microteaching average score.

Table 4. Relationship Between Teaching Style Domains and Microteaching Average Score (N=25).

Microteaching score	Teaching style domains							
	Sensitivity				Inclusion			
	Low		High		Low		High	
f	%	f	%	f	%	f	%	
78.0 - 80.9	1	4.0	0	0	0	0	1	4.0
81.0 - 83.9	1	4.0	0	0	1	4.0	0	0
84.0 - 86.9	1	4.0	2	8.0	0	0	3	12.0
87.0 - 89.9	0	0	5	20.0	1	4.0	4	16.0
90.0 - 92.2	2	8.0	3	12.0	0	0	5	20.0
93.0 - 95.9	1	4.0	9	36.0	4	16.0	6	24.0

Sensitivity Person's $r = .53$. Inclusion Pearson's $r = -.08$. Note Correlation coefficients are based on raw scores.

The relationship between sensitivity and final examination score was low and positive (.18) (Table 5), and between inclusion and final examination score was negligible and negative (-.08), which suggests that teaching style had little, if any, relationship to the final examination score. The relationship between sensitivity and final course score was substantial (.53) (Table 6) which indicated that the more a preservice teacher was able to 'sense' the shared characteristics of the learners, the greater their final course score. The relationship between inclusion and final course score was negative and negligible (-.06) which suggests that the final course score appeared unrelated to the inclusion construct of teaching style.

Table 5. Relationship Between Teaching Style Domains and Final Examination Score (N=25).

Final examination score	Teaching style domains							
	Sensitivity				Inclusion			
	Low		High		Low		High	
f	%	f	%	f	%	f	%	
77.0 - 79.9	2	8.0	0	0	1	4.0	1	4.0
80.0 - 82.9	0	0	0	0	0	0	0	0
83.0 - 85.9	1	4.0	5	20.0	3	12.0	3	12.0
86.0 - 88.9	0	0	5	20.0	0	0	5	20.0
89.0 - 91.9	1	4.0	2	8.0	0	0	3	12.0
92.0 - 94.9	2	8.0	7	28.0	3	12.0	6	24.0

Sensitivity Pearson's $r = .18$. Inclusion Pearson's $r = -.08$. Note. Correlation coefficients are based on raw scores.

Table 6. Relationship Between Teaching Style Domains and Final Course Score (N=25)

Final course score	Teaching style domains							
	Sensitivity				Inclusion			
	Low		High		Low		High	
f	%	f	%	f	%	f	%	
81.0 - 83.9	1	4.0	0	0	1	4.0	1	4.0
84.0 - 86.9	0	0	1	4.0	0	0	1	4.0
87.0 - 89.9	1	4.0	1	4.0	1	4.0	1	4.0
90.0 - 92.9	3	12.0	5	20.0	1	4.0	7	28.0
93.0 - 95.9	1	4.0	12.0	48.0	4	16.0	9	36.0

Sensitivity Pearson's $r = .53$. Inclusion Pearson's $r = -.06$. Note: Correlation coefficients are based on raw scores.

Conclusions and Recommendations

It can be concluded from this study that a positive relationship exists between preservice teachers' preferred learning style and performance in the Methods of Teaching Agriculture course. Preservice teachers preferring a field-independent learning style achieved higher scores than preservice teachers preferring a field-dependent learning style in the microteaching laboratory and overall course. Findings suggest that preservice teachers of agriculture possessing a field-independent learning style appear to be more adapted to teaching utilizing the problem-solving approach.

The findings are congruent with research by Witkin et al. (1977) and Koppleman (1980) that found teachers possessing a field-independent learning style to be more adapted to teaching using the problem-solving approach and tended to utilize the approach more in teaching. The findings further support Dunn and Dunn's (1979) conclusion that "teachers teach the way they learned" (p. 241). Teachers possessing field-independent learning styles perceive analytically finding it easier to promote problem-solving in teaching and ultimately problem-solving in their students.

Witkin et al. (1977) stated that "field-independent persons have shown interest in the teaching of vocational agriculture" (p. 40). The interest of persons with field-independent learning styles to teach agriculture can be linked to the emphasis the agricultural education profession places on teaching using the problem-solving approach. Consequently, can placing an emphasis on teaching using the problem-solving approach influence field-dependent persons to perceive the inability to quickly succeed in teaching agriculture causing job dissatisfaction and ultimately declining to continue in the profession? Further research needs to be conducted to explore what happens, if anything, to field dependent learners who enter a profession which specializes in problem-solving teaching.

With regard to teaching style, it was found that preservice teachers who preferred a more sensitive teaching style achieved higher microteaching scores and possessed a greater ability to teach utilizing the problem-solving approach. Preservice teachers who possessed student-centered characteristics were better able to 'sense' the shared characteristics of the learners and were more acclimated to teaching utilizing the problem-solving approach. The inclusion domain of teaching style, was not found to be associated with the ability to teach utilizing the problem-solving approach. Why did the sensitivity construct and not the inclusion construct have an influence on teaching using the problem-solving approach? Further research should be conducted to investigate the inconsistency between the influence of the sensitivity and inclusion constructs on teaching utilizing the problem-solving approach.

Teacher educators in agriculture must consider the learning styles of preservice teachers when planning instruction and preparing future agriculture teachers. The findings indicate that all preservice agriculture teachers in this study were not as well skilled at teaching utilizing the problem-solving approach. Teacher educators in agriculture must seriously consider providing preservice teachers with alternative approaches to teaching agriculture.

Teacher educators need to stress the importance of teachers of agriculture being student-centered. Conclusions from this study indicated a substantial association between preservice teachers who were sensitive toward the shared characteristics of the learners and the ability to teach utilizing the problem-solving approach. Stressing student centeredness in agriculture teachers may lead to improved teaching performance utilizing the problem-solving approach.

Further research on learning styles and teaching styles of preservice teachers of agriculture should be conducted in an effort to more effectively train and supervise teachers of agriculture. Canfield and Canfield (1976) noted that research regarding learning and teaching styles can serve as a basis for selecting teaching approaches. Additionally, research on teachers' learning and teaching styles should be expanded to practicing agriculture teachers. Through further research on teaching and learning styles, teacher educators will be in a position to better prepare teachers of agriculture.

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