Learning Style Variations Among Vocational Agriculture Students

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Recent research articles have reported a new approach to measuring the learning style characteristics of vocational students (Kendall, 1986; Kendall & Sproles, 1986). That research applied an exploratory study to a sample of vocational home economics students. Based on experiential learning theory (Kolb, 1984), the study identified six characteristics of learning styles typifying students to varying degrees in vocational home economics classrooms: (a) serious, analytical learner, (b) active, practical learner, (c) observation-centered learner, (d) passive, accepting learner, (e) concrete, detail, fact-oriented learner, and (f) non-adaptive, struggling learner. Variations of those learning styles by grade levels, prior vocational coursework completed and gender were also explored.

Establishing the validity and generalizability of these characteristics and their variations among sub-groups of high school students is an important part of the research process. Verification in a variety of research settings, places, and student groups is required and can be a lengthy, complex process as pointed out by Brinberg and McGrath (1985) in their pioneering book on validation. This paper reports a validation of this research on learning style characteristics that replicates and extends the Kendall and Sproles' approach to measuring learning styles characteristics to a much larger, demographically diverse and broadly representative sample of vocational agriculture students. Specific goals of the research were to answer two questions: (a) What learning styles do secondary vocational agriculture students prefer? and (b) Do these preferred learning styles vary by grade levels, years of vocational agriculture coursework completed, and gender? The findings of this research suggested there are significant learning style characteristics among vocational agriculture students, and these vary by grade levels, courses completed, and gender. These findings have implications for developing the most appropriate teaching styles matching students' specific modes of learning. Perhaps even more important, they suggest the general applicability of the learning style concept across very different vocational education programs.

Theoretical Framework

A brief introduction of the concept of learning styles and the theoretical framework of this investigation is necessary; see Kendall and Sproles (1986) and Kendall (1986) for further details. The concept of learning styles is recent in origin. A learning style is defined as "the way each person absorbs and retains information and/or skills: (Dunn, 1984, p. 12). Several approaches have been developed to assess students' learning styles (Dunn & Dunn, 1978; Gregorc, 1982; Kirby 1979; Kolb, 1976, 1984).

Recently Kendall and Sproles (1986) developed a new approach to measuring styles based on Kolb's (1984) experiential learning theory.

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Experiential learning theory appears particularly applicable to explaining learning styles of vocational students. The theory conceptualizes four different modes of learning abilities that students need to succeed: (a) concrete experience abilities, (b) reflective observation abilities; (c) abstract conceptualization abilities, and (d) active experimentation abilities. Using this theory as the foundation, Kendall and Sproles (1986) developed the Secondary Learning Styles Inventory and administered it to a sample of 482 vocational home economics students. Factor analysis of the data partially confirmed Kolb's concept of learning style characteristics, but found additional characteristics as well which appear to be important, particularly to the secondary vocational education student. The Secondary Learning Styles Inventory was found to measure six learning style characteristics: (a) serious, analytical learner, (b) active, practical learner, (c) observation-centered learner, (d) passive, accepting learner, (e) concrete, detail, fact-oriented learner, and (f) non-adaptive, struggling learner. Further research found variations in preferred learning styles by grade levels and prior home economics courses taken, but not gender (Kendall, 1986).

These six learning style characteristics were further validated by replicating the Kendall and Sproles study with students in vocational agriculture (Sproles, Cox, & Sproles, in press). Employing the same factor analytic procedure, this research found the same six learning style characteristics, thereby verifying the Kendall and Sproles research. These data and the six learning style characteristics validated in the preceding studies are the basis for the research reported in this paper.

Methodology

The Secondary Learning Styles Inventory was administered to 9th through 12th grade vocational agriculture students in urban and rural schools throughout Arizona during April, 1986. A total of 41 schools and 2,101 students participated in the study. Students completed the survey during vocational agriculture classes. They were given the survey while the teacher read the directions from a prepared script. Students were asked to answer each question to the best of their ability. All completed questionnaires were reviewed, and those instruments which were incomplete were deleted.

The six major characteristics of learning styles were validated through factor analysis using the principle components method with varimax rotation of factors in a prior study (Sproles, Cox, & Sproles, in press). The items that loaded on each factor are shown in Table 1, and details of this methodology are published elsewhere (Kendall & Sproles, 1986; Sproles, Cox, & Sproles, in press). The factor analysis results established the construct and content validity of the six factor model for vocational agriculture students.

Analysis of the research questions followed two approaches. First, to assess preferred learning styles among students, frequency counts were made of responses to the statements loading on each factor. The percentage of those who "agreed" or "strongly agreed" were combined into a single category, thus measuring the overall learning style preference for the statement. The second objective was addressed by separately crosstabulating grade levels, years of vocational agriculture completed, and gender against each learning style statement. For this analysis, each statement was collapsed to two points, those agreeing with the statement (those preferring that learning style) and those who were neutral or disagreeing (those with no preference or a dislike for that learning style). This provided a useful summary measure of preference

Table 1

Learning Style Characteristics: Six Factor Model, Vocational Agriculture Students

Factors	Factor Loadings
Factor 1--Serious, Analytical Learner	
I like to think things out rationally and carefully.	.73
In learning I value careful and logical thinking.	.68
I enjoy thinking through difficult things and making wise decisions.	.63
I think seriously and think back on what I learn.	.57
I enjoy putting together new ideas and thoughts.	.47
I like hearing about new ideas and facts.	.46
Factor 2--Active, Practical Learner	
Actually doing things is my preferred way of learning.	.73
I learn more through actual experience and practice with a subject.	.67
I prefer learning actual practices, not theories.	.62
I enjoy doing experiments to see how things work.	.57
I learn well from practical and useful activities.	.48
I learn things well when I'm emotionally involved and excited.	.44
Factor 3--Observation-Centered Learner	
I learn well by watching what others do.	.78
Observing is a good way for me to learn.	.75
Factor 4--Concrete, Detail, Fact-Oriented Learner	
I enjoy taking notes and writing down facts I learn.	.74
I like to look at things in detail, breaking them down into separate parts.	.59
Factor 5--Passive, Accepting Learner	
I usually accept things I learn without questioning them.	.68
I learn best when I listen quietly rather than speaking up in class.	.64
I think mainly about today, not tomorrow.	.59
I learn only if I put in lots of work and energy.	.40[a]
Factor 6--Non-Adaptive, Struggling Learner	
In many learning situations I feel unsure and uncertain.	.62
I quickly understand things I learn, almost by intuition.	-.53
I learn only if I put in lots of work and energy.	.46[a]

Note. Source--Sproles, Cox & Sproles (in press).

[a]Item with factorial complexity of 2.

on each individual scale. The Chi Square statistic was used to test the significance of each crosstabulation.

Findings

After elimination of 107 questionnaires with incomplete or unlikely response patterns, 1,994 respondents were included in the final sample. The sample was 32% female and 68% male. Thirty-nine percent of the subjects were in 9th grade, 28% were in the 10th, 20% in the 11th, and 13% in the 12th grades. Forty-three percent of the sample were 14-15 years old, and 57% were 16-18 years old. Thus, the sample was demographically diverse and representative of vocational agriculture students.

The specific items which describe the six learning style preferences and the percentage of respondents who agreed with each item are shown in Table 2. In general, these data suggest prevalent ways of learning that the majority of subjects preferred. Approximately six of ten students viewed themselves as "serious, analytical learners," as evidenced by the 57% to 73% who agreed with the statements that measured this characteristic. Further, about three-fourths of the subjects preferred "active, practical learning" (experiments, actually doing things). Likewise, over two-thirds preferred observation-centered learning as well. This may suggest a learning style that features "first observe, then do" is appropriate for the majority of vocational agriculture students. The demonstration methodology utilized by vocational agriculture teachers appears to be sound.

The remaining data in Table 2 suggest lesser utilized learning styles, and perhaps learning problems, with a substantial proportion of students. For example, a substantial portion (perhaps 20% to as much as 35%) often prefer passive learning. Students with such a learning style may contrast sharply to the more active student learners and need special attention. A similar proportion appears to be "detail, fact-oriented" learners; however, note-takers and fact-gatherers appeared to be a small percentage in these classrooms (17%). Finally, a substantial number of students, perhaps 20% or more, may be non-adaptive, struggling learners. This is a speculative characteristic, measured by only two items, but it is one of which teachers need to be both aware and sensitive.

Tables 3 through 5 report variations in preferred learning styles by grade level, years of vocational agriculture completed, and gender. To conserve space, data are shown for only those statements where significant Chi Square values were observed ($p<.05$), and only the percentage of students agreeing with each statement is reported. This presentation provides a complete yet parsimonious summary of the major demographic variations in learning styles.

As Table 3 shows, there are significant variations in learning styles across grade levels in school. The findings indicate important grade differences for two of the six learning styles, serious analytical learner, and active, practical learner. Preference for these styles appears to increase with grade level. Perhaps this indicates that general interest in learning increases through the grades. It may also be a function of attrition of the less serious students who employ other learning styles.

Table 4 indicates that major variations exist in preferred learning styles by years of vocational agriculture completed. In general, preference for serious, analytical learning and active, practical learning appears to increase with years of vocational agriculture completed, particularly with four-year completers. Students also appear to become

Table 2

Learning Style Preferences of Vocational Agriculture Students

Statements Measuring Learning Style Characteristics	Agreement %
Factor 1--Serious, Analytical Learner	
I like to think things out rationally and carefully.	60
In learning I value careful and logical thinking.	57
I enjoy thinking through difficult things and making wise decisions.	57
I think seriously and think back on what I learn.	57
I enjoy putting together new ideas and thoughts.	66
I like hearing about new ideas and facts.	73
Factor 2--Active, Practical Learner	
Actually doing things is my preferred way of learning.	74
I learn more through actual experience and practice with a subject.	80
I prefer learning actual practices, not theories.	65
I enjoy doing experiments to see how things work.	76
I learn well from practical and useful activities.	76
I learn things well when I'm emotionally involved and excited.	68
Factor 3--Observation-Centered Learner	
I learn well by watching what others do.	64
Observing is a good way for me to learn.	77
Factor 4--Concrete, Detail, Fact-Oriented Learner	
I enjoy taking notes and writing down facts I learn.	17
I like to look at things in detail, breaking them down into separate parts.	41
Factor 5--Passive, Accepting Learner	
I usually accept things I learn without questioning them.	20
I learn best when I listen quietly rather than speaking up in class.	37
I think mainly about today, not tomorrow.	27
Factor 6--Non-Adaptive, Struggling Learner	
In many learning situations I feel unsure and uncertain.	21
I quickly understand things I learn, almost by intuition.	32[a]

Note. n = 1994.

[a]This item is reverse worded. Forty-nine percent of subjects responded "neutral" to this statement, and 19% "disagree" or "strongly disagree," implying a large percentage of learners experiencing some learning difficulties.

Table 3

Variations in Learning Style Preferences by Grade Level

Statements Measuring Learning Style Characteristics	Agreement by Grade Level 9 %	10 %	11 %	12 %
Serious, Analytical Learner				
In learning I value careful and logical thinking.	52	56	61	67**
I enjoy thinking through difficult things and making wise decisions.	53	59	59	64**
Active, Practical Learner				
Actually doing things is my preferred way of learning.	71	75	74	85**
I prefer learning actual practices, not theories.	60	66	68	70**

Note. n = 1994.

**$p<.01$.

less passive and accepting learners in later years. These findings indicate that more advanced, multi-faceted learning strategies of a practical and/or analytical nature may be employed with more experienced students. It also appears that if teachers utilize techniques tied to such learning styles, the activities will be well-received by the large majority of students. Data shown in this table also imply that students who completed more years of vocational agriculture coursework were more concrete, detailed learners.

Variations in learning styles may also be associated with gender, as Table 5 indicates. Male students were more likely to prefer actual, hands-on, manipulative experiences in learning than females. In contrast, male students in vocational agriculture were less inclined to prefer note-taking and factual learning than females. Female students were less likely to prefer experimentation and breaking subject matter down into detailed, separate parts. A slightly higher proportion of males than females appeared to prefer observation-centered and passive learning styles. Finally, a larger proportion of males than females perceived they quickly understand things.

Conclusions and Implications

This research examined preferred learning styles of secondary vocational agriculture students and found variations across learning style characteristics, including (a) serious, analytical learner, (b) active, practical learner, (c) observation-centered learner, (d) passive, accepting learner, (e) concrete, detail, fact-oriented learner, and (f) non-adaptive struggling learner. Significant demographic variations were noted by grade levels, years of vocational agriculture coursework completed, and gender.

Table 4

Variations in Learning Style Preferences by Number of Years of Vocational Agriculture Completed

Statements Measuring Learning Style Characteristics	Agreement by Years Completed 1 %	2 %	3 %	4 %
Serious, Analytical Learner				
I like to think things out rationally and carefully.	57	65	57	68**
In learning I value careful and logical thinking.	53	58	59	70**
I enjoy thinking through difficult things and making wise decisions.	53	61	61	69**
Active, Practical Learner				
Actually doing things is my preferred way of learning.	70	79	79	87**
I learn more through actual experience and practice with a subject.	79	84	78	84**
I prefer learning actual practices, not theories.	61	71	65	72**
Concrete, Detail, Fact-Oriented Learner				
I like to look at things in detail, breaking them down into separate parts.	39	46	39	46*
Passive, Accepting Learner				
I learn best when I listen quietly rather than speaking up in class.	40	36	32	31*
I think mainly about today, not tomorrow.	30	25	22	27*
Non-Adaptive, Struggling Learner				
I quickly understand things I learn, almost by intuition.	30	38	32	37**

Note. n = 1994.

*$p<.05$. **$p<.01$.

The results provide a relatively complete profile of individual learning styles, suggesting important modes of learning and individual differences as well. Once a teacher knows the profile of learning style characteristics of students in his/her classroom, teaching strategies can be utilized to best take advantage of the preferences of learners. Students who are taught in the modes in which they are most comfortable are likely to feel more confident and competent. Individuals having non-adaptive learning characteristics may be identified for special attention as well. Simply knowing a student's learning style preferences will not identify a single teaching strategy best for all students, but it does suggest a range of alternatives and those most likely to succeed.

Table 5

Variations in Learning Style Preferences by Gender

Statements Measuring Learning Style Characteristics	Agreement by Gender	
	Female %	Male %
Active, Practical Learner		
Actually doing things is my preferred way of learning.	69	77**
I prefer learning actual practices, not theories.	59	67**
Observation-Centered Learner		
Observing is a good way for me to learn.	74	79**
Concrete, Detail, Fact-Oriented Learner		
I enjoy taking notes and writing down facts I learn.	21	16**
I like to look at things in detail, breaking them down into separate parts.	37	43*
Passive, Accepting Learner		
I learn best when I listen quietly rather than speaking up in class.	33	39*
I think mainly about today, not tomorrow.	22	30**
Non-Adaptive, Struggling Learner		
I quickly understand things I learn, almost by intuition.	26	35**

Note. n = 1994.

*p<.05. **p<.01.

One special application of these profiles is to help students understand how they best prefer to learn. Most students prefer some learning styles over others, and the use of a simple paper and pencil measure such as the Secondary Learning Styles Inventory (Kendall & Sproles, 1986) may help students better realize their preferences. It also helps students to know that vocational agriculture teachers care about their learning and want to assist learners in the best way possible. Teachers may then help students recognize the need to enhance their learning capabilities as well, by emphasizing less-frequently-used ways of learning. While learning in a new mode at first presents students with a struggle, for example detail and fact-oriented learning, once the struggle is overcome the student may well develop a more complete, mature and integrated approach to learning.

Conclusions may be drawn from this study with respect to implications for immediate and practical utilization of results. For example, current practice in vocational agriculture instruction seems to concentrate a majority of time in classroom instruction rather than practical exercises during the first two years. Likewise, during the junior and

senior years, in general, more time is devoted to practical laboratory and "hands-on" activities outside the classroom. This research indicates that as students complete more years of vocational agriculture, their learning style becomes more concrete, detail, fact-oriented. Also, a substantial portion of first- and second-year students who are 14-15 years of age are active, practical learners. Hence, teachers should consider incorporating additional hands-on, experiential, and actual performance activities into the first two years of instruction. In addition, teachers should consider incorporating additional informational lessons and multifaceted teaching strategies into the last two years of instruction in vocational agriculture.

The findings of this research have also built on and extended Kendall's (1986) research on variations in learning styles among vocational home economics students. Similar levels of preference for each learning style were found in both this and the Kendall study on all six characteristics. However, in comparing the results of the vocational home economics and agriculture studies, there may be differences in student learning style by grade, coursework and gender. This comparison of results between the two studies suggests it may well be that vocational programs have different kinds of students with differing learning needs at each level, even though they have overall similarities in displaying the same range of preferred learning styles. This important issue requires further research and verification.

In conclusion, the characterization of student learning styles is a new tool for the vocational agriculture teacher and for vocational educators in other programs as well. This research has demonstrated a helpful approach to measuring learning styles, and it has shown six characteristics of learning styles that appear to vary significantly among secondary vocational agriculture students. Continued research is required to complete this characterization and categorization of learning styles. The study of student individual learning styles is coming of age, and vocational educators can apply measures of learning styles to understand students better and thus develop the most appropriate teaching strategies for various program areas.

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