

The Learning Styles of Youth in Nonformal Agricultural Education Programs

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While agricultural concepts and skills are commonly taught in vocational classroom settings, education "in" and "about" agriculture also occurs in nonformal educational programs that provide diverse learning experiences for youth. Current research (Eschenmann, 1988; Dunn, 1989) suggests that the context of the learning situation not only influences what is learned, but individual ability to retain new or difficult information is facilitated when learning environments match learning strengths.

Limited educational research has been conducted on learning styles of students studying agricultural subjects in a formal school setting or the 4-H club. Previous researchers (Rollins and Scanlon, 1991; Rollins, 1990; Cox, Sproles, and Sproles, 1988) have expanded the empirical evidence about learning styles of youth receiving formal education in agriculture. Crom (1986) found that two of every three 4-Hers in clubs preferred learning through an experience-based approach and liked role playing, simulation, and discussion groups.

Willets and Crider (1990) reported that the two most important human resource development issues in Pennsylvania were youth-related. Using its research-based, nonformal educational program, Penn State Cooperative Extension targeted its educational initiatives towards developing life skills for all youth and at-risk youth. Life skills include enhanced self-esteem, goal setting, personal development, citizenship, problem-solving, decision making, leadership, social and interpersonal relationships, and communication. Youth who do not meet their full potential due to being affected by two or more factors, such as poverty, substance abuse, pregnancy, illiteracy, homelessness, etc. are considered at-risk (Penn State Cooperative Extension, 1991).

In Adolescents-at-Risk: Prevalence and Prevention, Dryfoos (1990) listed eleven common components of successful prevention programs, most of which are exemplified in 4-H programs: one-on-one interaction, achievement-oriented programs, social skills training, peer interventions, parental involvement, program locus in schools, and programs brought into schools by outside agencies.

Four-H is a nonformal educational program designed to improve the cognitive and perceptual skills of youth (USDA, 1980) by emphasizing a "learning by doing" approach through projects, programs, and activities. Tyler (1961) stated that 4-H reinforced learning via concrete "doing and seeing" experiences with the more theoretical explanations of why and how. He also observed that 4-H was an effective educational process when compared to school or extracurricular activities.

The two predominant program delivery modes used in 4-H are clubs and school enrichment programs. Forty percent of all 4-H members in Pennsylvania are enrolled in clubs while 32% nationally are 4-H club members. School enrichment programs account for 55% of Pennsylvania 4-H membership and 52% of 4-H membership nationally. Although both delivery modes (Table 1; USDA, 1988) share some similar organizational arrangements, instructional content and methods, and instructional strategies, certain social/psychological aspects of the two delivery modes are distinctly different.

Table 1. Comparison of Two Delivery Modes with Factors that Influence Application of 4-H Learning Experiences

	Instructional content	Organizational arrangement	Instructional strategies
<u>School Enrichment Programs</u>	Subject matter Some group dynamics	Relationship: teacher resource and students Single subject matter Limited meeting time Large groups Conforms to school schedule	Few learn by doing activities Little peer teaching Few demonstrations Illustrated talks Lectures Few small group discussions Audio/visuals Some contests Some exhibits
<u>Clubs</u>	Subject matter Meeting conduct Officer roles Group dynamics Planning Public speaking Recordkeeping Decision-making Problem-solving Achievement Motivation Interpersonal relations Affiliation	Relationship: adult, Junior and teen 4-Hers plan program Member/officer/chair 4-Hers meet through year Parental involvement	Projects Peer teaching Demonstration Illustrated talks Lectures Small group discussion Audio/visuals Publications Tours Contests Exhibits

For more than 75 years, 4-H has provided opportunities to emphasize individual interests in learning and career exploration and offered a freer range of learning opportunities than school curriculum. The close relationship with adults evident in 4-H programs is also being implemented by schools to prevent at-risk youth from becoming dropouts. Understanding student learning styles was one factor identified by Eschenmann (1988) as a requirement for improving classroom environments when working with at-risk youth.

Purpose and Objectives

The primary purpose of this study was to profile and compare the preferred learning styles of Pennsylvania 4-H members in clubs and school enrichment programs of nonformal agricultural education. Specific objectives of the study were to describe 4-H members: 1) cognitive learning style--how they process information; 2) perceptual

learning style--how they respond to receiving information; and 3) preferences for an instructional environment.

Procedures

Population/Sample

Survey research methodology was used in this study. The target population for the study included all 86,000 4-H members enrolled in the 67 Pennsylvania counties during 1989-90. In order to obtain a stratified random sample for the study, the following procedures were used: 1) based upon a population of 85,000, the minimum sample size ($n=460$) was determined by using Oliver, Hinkle, and Hinkle (1983) with the effect size of .20 and the power of the statistical test equal to .99; 2) the population of 4-H members within each extension administrative region was determined and the relative proportion of members in school enrichment and club programs was determined; 3) counties were randomly selected within each region and 4-H agents were asked to participate; and 4) 4-H agents randomly selected intact 4-H clubs and school enrichment programs (classes). The number of 4-H members who participated in the study was 539.

Instrumentation

The instrument used to collect the data for this study was the Learning Style Profile (LSP) developed by the National Association of Secondary School Principals. The LSP provides information related to three major areas--cognition, perceptual learning styles, and response to study and instructional environment. Appropriate testing was completed to establish face, content construct, and concurrent validity. The average internal consistency reliability measured by Cronbach's alpha is .61 with a range from .47 to .76 for the subscales. Although reliability figures for the subscales appear to be low, Keefe and Monk (1988) indicated these reliabilities are acceptable for short tests intended to collect initial diagnostic information. Since reliability is largely a function of length of a subtest, longer subtests with similar items would provide considerably high reliabilities. For example, if the typical 5-item subscale were expanded to 15 similar items, the average reliability would be approximately .82 (Keefe & Monk, 1988). Demographic information was collected via an instrument developed by the researchers.

Data Collection

Data for this study were collected from March through July 1990 by seven Penn State Cooperative Extension agents. Each agent received training in administration of the instrument and data collection during a formal workshop conducted in January 1990 by the authors.

Analysis of Data

The data were converted to standard scores as per procedures developed by the authors of the LSP and as described in Keefe & Monk (1988). For the purposes of this paper, descriptive and inferential statistics were used. Comparisons were made between 4-H members' scores and national sample norm scores contained in Keefe & Monk. The national sample represents 5,000 students in grades six through twelve.

Results

Members' Background

The sample (539) was representative of the population of Pennsylvania 4-Hers by gender--238 males (44%) and 301 females (56%). Almost two-thirds (61%) of the 4-Hers were members of school enrichment programs while the remainder (38%) were members of

4-H clubs which was representative of the state's enrollment. Almost half (48%) of the 4-Hers selected animal science as their project area while one-third (33%) were in project areas other than plant science (5%) or home economics (8%).

Objective 1: Cognitive Learning Styles

Data in Table 2 indicate that 4-H members deviated by more than one standard deviation from the national sample on three of the five subscales: analytic, spatial, and discrimination. The analytic subscale consists of five items which measure one's ability to isolate critical elements of a problem. Persons scoring low in analytic skill have difficulty with certain problem-solving tasks while individuals scoring high excel in mathematics and sciences which require taking some critical element of a problem and using it in a different way (Keefe & Monk, 1988).

Table 2. Means and Standard Deviations for Cognitive Subscales of 4-H Members and National Sample

Cognitive subscale	4-H members n=539		National sample n=5000	
	Mean	S.D.	Mean	S.D.
Analytic	1.16	0.95	2.50	1.46
Spatial	1.40	0.96	2.45	1.51
Discrimination	1.61	0.92	3.20	1.35
Sequential	4.86	1.30	4.89	1.50
Memory	6.16	2.45	5.91	2.53

The spatial subscale (five items) measures a person's ability to identify a geometric shape, remember it, and discriminate it from other similar patterns. Keefe and Monk (1988) suggest that a relationship exists between this skill and success in mathematics and technical courses (drafting).

Discrimination skills (five items) permit an individual to visualize elements of a task and focus attention on details. In comparison to the national sample, 4-H members were much less discriminating, more easily distracted, and would be less successful at tasks requiring attention.

The sequential subscale (six items) indicates an ability to process successive and simultaneous mental tasks. When 4-H members were asked to determine if geometric shapes were present or absent in a set of simple puzzles, they were comparable to the national sample on this subscale.

The memory subscale (12 items) measures an individual's capability to retain an image of a complex figure long enough to make a judgment of whether or not it is the same or different in succeeding representations. Even though 4-H members scored higher than the national sample on this subscale, both groups answered approximately half of the items correctly.

Data in Table 3 reveal that 4-Hers in clubs scored higher on three of the five cognitive subscales than their peers did in school enrichment programs. When age was controlled, no significant differences in these subscales were discovered between the two groups.

Table 3. Cognitive Skill Development of 4-H Members in School Enrichment and Club Delivery Modes

Skill	School Enrichment		Club		t	df
	Mean	S.D.	Mean	S.D.		
Spatial skill	1.26	.927	1.66	.992	-4.74*	537
Sequential	4.69	1.37	5.07	1.13	-3.55*	503
Mrmory skill	5.71	2.30	6.40	2.64	-3.11*	381

Note: *p<.05; N=335 for School Enrichment group and N = 204 for Club group

Objective 2: Perceptual Learning Styles

Table 4 presents means and standard deviations of 4-H members and the national sample for perceptual responses. Three subscales measure an individual's tendency to react to a series of words representing various concepts and objects in terms of visual (15 items), auditory (15 items), or emotive (12 items) modalities. Based on the findings of this study, 4-Hers tend to process information through greater visual and emotive modalities than the national sample.

Table 4. Means and Standard Deviations for Perceptual Responses of 4-H Members and National Sample

Perceptual subscale	4-H members n=539		National sample n=5000	
	Mean	S.D.	Mean	S.D.
Visual response	8.85	2.94	8.72	2.89
Auditory response	4.42	2.18	4.61	2.42
Emotive response	6.92	2.64	6.67	2.54

Objective 3: Instructional Preferences

Means and standard deviations for 4-H members and the national sample for preferences to study and instructional environment are presented in Table 5. The persistence orientation

Table 5. Means and Standard Deviations for Instructional Environment of 4-H Members and National Sample

Instructional subscales	4-H members n=539		National sample n=5000	
	Mean	S.D.	Mean	S.D.
Persistence	14.35	3.14	13.67	2.87
Verbal Risk	12.87	2.64	12.35	2.90
Manipulative	13.52	3.24	12.88	3.21
Verbal/spatial	3.22	1.30	3.74	1.92
Grouping	14.00	2.61	17.8	3.42

score (four-item Likert scale) indicated 4-Hers had a greater willingness than the national sample to work at a difficult task until completed or without adult supervision. Four-H

members were also more willing to verbalize and state opinions even if others disagreed (verbal risk subscale--four item Likert scale) and preferred "hands-on" instruction (manipulative subscale--four item Likert scale). A lower mean score on grouping (five item Likert scale) indicated that 4-Hers preferred to learn in smaller groups and did not prefer as strongly as the national sample to receive instruction through verbal or spatial activities (six items).

Data in Table 6 reveal that 4-Hers in school enrichment programs had higher mean scores on both the persistence orientation and afternoon preference subscales. The 4-H club members had higher mean scores for both early and late morning preferences as well as grouping preference.

Table 6. Preferences for Instructional Environments by 4-H Members in School Enrichment and Club Delivery Modes

	Mean	SD	t	dfd
Persistence orientation				
School Enrichment ^a	15.08	3.01	6.85*	537
Club ^b	13.24	3.11		
Early morning preference				
School Enrichment ^a	5.61	1.87	-2.18*	537
Club ^b	5.96	1.74		
Late morning preference				
School Enrichment ^a	5.38	2.02	-2.10*	537
Club ^b	5.72	1.78		
Afternoon preference				
School Enrichment ^a	10.58	2.13	4.45*	537
Club ^b	9.76	2.07		
Grouping preference				
School Enrichment ^a	13.91	2.71	-2.55	537
Club ^b	14.50	2.54		

Note: * $p < .05$; ^aN=335; ^bN=204.

Discussion and Recommendations

The learning style mean scores of Pennsylvania 4-H members were below the national norm on four of the five cognitive subscales. Evidence from benchmark investigations into learning styles, learning activities, and cognitive development indicates that youth receiving both formal and nonformal education "in" and "about" agriculture lack cognitive skills--the ability to think, solve problems, and effectively process information. Curriculum and instructional strategies to promote cognitive skill development are important as 4-H and school programs move into science- and technology-based curriculum within formal school systems and club settings. Inservice education must include cognitive skill development to educate agents, leaders, and teachers how to teach youngsters "how to think." By developing curriculum and instructional strategies which teach young people how to become better thinkers, we simultaneously promote the learning of agricultural concepts and provide better citizens for the decades ahead. Through the process of "teaching thinking," we can teach 4-H members how to become better thinkers and use their cognitive abilities which is one of the most basic of the life skills.

Mean scores for the instructional environment 4-Hers preferred indicated they were more persistent in working at difficult tasks, less anxious and more willing to take risks, and preferred manipulative activities in much smaller group settings than the national sample. Although mean scores from several subscales in cognitive development and preferences for instructional environments were statistically significant when compared by delivery modes, no causal relationship can be established nor can any conclusions be derived about the attributes of the club delivery mode.

There is little reason to believe, however, that the traditional 4-H club which delivered nonformal educational programs for over 75 years will disappear, especially from the more rural parts of the country. In fact, some of the identical attributes (See Table 1) of the organizational arrangements and instructional content characteristically found only in the 4-H club may contribute to the appeal and the success of educational programs in rural, suburban, and urban neighborhood settings. In a much less urban environment thirty years ago, Tyler (1961) identified several of these identical attributes as being effective in preventing at-risk youth from dropping out of school. As Cooperative Extension and 4-H expand youth programming to broader and more diversified audiences, research should be undertaken to determine which attributes of each delivery mode are most effective with different clientele.

The advent of today's "youth at risk" crisis provides both an opportunity as well as a challenge to Cooperative Extension. The challenge for Extension is to continue to provide for the personal development of youth in areas such as leadership, building self-esteem, and citizenship. The opportunity for Extension is to design and deliver research-based, prevention-oriented programs that teach life skills--the ability to think and solve problems, the sense of belonging, being recognized, having responsibility, and being successful--via delivery modes that take into account and are congruent with 4-H members' learning styles.

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