Journal of Agricultural Education
Volume 54, Number 4, pp. 206 – 220
DOI: 10.5032/jae.2013.04206

The Impact of Learning Styles on Learning Outcomes at FFA Camp: What Campers Retain Over Time

Nicholas R. Brown
Robert Terry Jr.
Oklahoma State University
Kathleen D. Kelsey
University of Georgia

Twenty-four states host FFA summer camps to support adolescent maturation along with indoctrination into the culture and values of the FFA. Camps typically include a variety of activities designed to engage members in social activities and non-formal academic content. More than 1500 campers attend the Oklahoma FFA Alumni Leadership Camp annually and are taught leadership curriculum. Using a split-plot factorial repeated measures quasi-experimental design, we established learning styles of campers and the relationship between learning style and learning outcomes. Preferred learning style had no effect on the amount of information learned or retained by campers when comparing mean scores of pretests, posttests, and delayed posttests. However, extroverts had more positive attitudes toward camp than introverts. Camp planners are advised to developmentally evaluate academic curriculum used during camp in an effort to attend to the unique psychosocial needs of introverts to improve their attitudes toward camp.

Keywords: learning styles, FFA camp, attitudes, non-formal learning

The National FFA Organization (FFA) seeks to make "a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" (mission statement, National FFA Organization, 2008, p. 5). In support of the mission, FFA sponsors numerous leadership experiences, including summer camps that focus on developing personal leadership skills among participants, namely eighth through twelfth grade students (National FFA Organization, n.d.). Twenty-four state FFA associations offer summer camps, including Oklahoma, which has hosted a camp for 30 years (McCrea, 2011). The camps encourage youth to improve their social, personal, and leadership attributes and prepares FFA officers and members for success in the classroom (Conners, Falk, & Epps, 2010).

Approximately 1,500 campers attend Oklahoma FFA Alumni Leadership Camp annually (McCrea, 2011). Camp participation is predicated upon three criteria: (a) completing at least one year of agricultural education coursework at the eighth-grade level or higher, (b) being preenrolled in an agricultural education course for the following semester, and (c) paying the camp fee (K. Boggs, personal communication, May 16, 2011).

Camp leaders seek to deliver not only a recreationally and socially satisfying experience for campers, but also an academically rich curriculum in leadership and communication studies that compliments agricultural education classroom instruction. Small group peer leaders (19 year old camp alumni) use breakout sessions to deliver academic curriculum similar to that used in formal classroom settings (K. Murray, personal communication, May 16, 2011). Given the resources devoted to creating and delivering academic curriculum, camp leaders sought to determine the impact of the breakout sessions on knowledge gained and retained over time among campers. Knowledge retention is often predicated on learner characteristics such as learning styles, among other attributes (Cano & Garton, 1994; Dyer & Osborne, 1996; Lambert, Smith, & Ulmer, 2010). Therefore, the study was designed to understand better the impact of campers' learning styles on knowledge gained and

retained over time. The reported findings can be transferred to similar non-formal FFA activities, including summer camps hosted by other states.

Learning styles have been defined as "the way people absorb, process, and retain information" (DeBello, 1990, p. 203), and were operationalized in this study using Jung's (1971) personality dimensions of extraversion, introversion, sensation, and intuition as attributes that may impact learning outcomes.

Much research has been conducted exploring the impact of learning style on academic outcomes in school-based agricultural education (Brown & Terry, 2013; Cano & Garton, 1994; Cano, Garton, & Raven, 1992; Dyer & Osborne, 1996; Friedel & Rudd, 2006; Garton, Spain, Lamberson, & Spiers, 1999; Lambert, Smith, & Ulmer, 2010; Marrison & Frick, 1994; Whittington & Raven, 1995). An abundance of literature associated with learning styles also exists in the broader educational context, implicating learning styles as a variable of considerable interest when studying curriculum effectiveness (Hansen & Stansfield, 1982; McDonald, 1984; Mehdikhani, 1983; Miller, 1991; Paradise & Block, 1984).

Numerous learning style inventories have been developed to diagnose an individual's style and predict preferred learning processes in formal classroom settings. An early and popular tool was the Gregorc Style Delineator™ (GSD), which classified learners into four sub-types: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR), and Concrete Random (CR) (Gregorc, 1982). The GSD used a continuum consisting of concrete and abstractness on opposing ends to classify learners. Concrete learners are prone to thinking in terms of right or wrong versus abstract learners who find value in the idea that things could be right and wrong and are open to ambiguity (Gregorc, 1982). Lambert, Smith, and Ulmer (2010) used the GSD to determine if mind styles affected the relational satisfaction between mentors and protégés who were participating in a new teacher-mentoring program.

Several researchers in agricultural education have used the Group Embedded Figures Test (GEFT) to assess students' preferred learning style (Cano & Garton, 1994; Cano & Metzger, 1995; Dyer & Osborne, 1996; Garton et al. (1999). The GEFT classifies learners as field-dependent or field-independent, where field-dependent learners focus on the social environment and struggle with problem solving and field-independent learners prefer to perform activities independently and excel in solving problems (Oltman, Raskin, & Witkin, 1971).

The Kolb Learning Style Inventory (KLSI) identifies nine learning styles based upon an individual's preference among learning modes identified by Kolb (1984); they are concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb & Kolb, 2009). The KLSI was theoretically rooted in Jung's (1971) psychological trait theory (Kolb, 1984).

More recently, the Paragon Learning Style Inventory (PLSI) (Shindler & Yang, 2003) emerged as an alternative to Kolb's often-criticized model for its overly complex application (Loo, 1999). Similar to the KLSI, Jung's (1971) four dimensions of extroversion-introversion, sensation-intuition, thinking-feeling, and judging-perceiving function as the theoretical foundation for the PLSI. The 52 items making up the PLSI were constructed using a single question or stem statement with two opposing statement choices. Shindler and Yang (2003) indicated that the first two Jungian types, extroversion versus introversion and sensation versus intuition, most influence how an individual learns and performs in an academic setting, and they named and described four learning styles associated with the two type dimensions.

Action Oriented Realists are people who are both extraverted and sensate. They thrive on action and prefer to work in groups. They are also impatient with slow, complicated situations and place high value on practical results. *Action Oriented Innovators* are people who are both extraverted and intuitive. They share their thoughts openly and enjoy testing their many theories with the group. They are also deterred by details and routine activities. *Thoughtful Realists* are people who are both introverted and sensate. They make careful, steady choices and prefer to work alone. Although they are not expressive by nature, they are detailed observers. Finally, *Thoughtful Innovators* are people who are both introverted and intuitive. They are excellent problem solvers and prefer to work alone

on their own thoughts and ideas. They are fascinated with scientific ideas and are future oriented. (Shindler & Yang, 2003)

Many agricultural education scholars have focused their work on the impact of learning styles on various attributes including teaching impact, learning outcomes, satisfaction with schooling and mentoring experiences, and creative thinking (Cano & Garton, 1994; Cano et al., 1992; Dyer & Osborne, 1996; Friedel & Rudd, 2006; Garton et al., 1999; Lambert et al., 2010; Marrison & Frick, 1994; Whittington & Raven, 1995). The wider body of educational research (Hansen & Stansfield, 1982; McDonald, 1984; Mehdikhani, 1983; Miller, 1991; Paradise & Block, 1984) has also used learning styles as a key variable for examining the impact of style upon similar constructs, with similar results – no significant differences between groups. These findings incriminate learning styles as an inconclusive variable for predicting teaching and learning outcomes.

However, the majority of learning style research has been conducted in formal classroom settings, whereas FFA camps are noted as non-formal learning environments (Kasworm, Rose, & Ross-Gordon, 2010). There is a paucity of research examining the effect of learning styles of leaders and learners in non-formal settings; therefore, research exploring the impact of camper learning style on learning outcomes in an FFA camp setting was warranted (Brown & Terry, 2013).

Theoretical Lens

Jung (1971) outlined traits that affect how people learn, act, think, communicate, and view the world. He identified four factors that determine a person's psychological type using four continua: Extrovert-Introvert, Sensate-iNtuitive, Thinker-Feeler, and Judger-Perceiver. People trend naturally toward one characteristic of each dyad, resulting in 16 possible psychological types. Each type predicts how people learn, behave, and interact with others.

Extroverts are drawn to other people or objects as a source of energy, while introverts draw energy from the self (Jung, 1971). Shindler and Yang (2003) explained further that extroverts are more comfortable and confident in social environments and gain their ideas from external forces, while introverts prefer to work alone, set their own standards, and acquire ideas from within.

Intuition or sensation explains how people process and make meaning of ideas. Shindler and Yang (2003) explained that sensates view ideas as physical and real, whereas intuitives operationalize ideas as real and see them "as a world in and of themselves" (p. 2). Sensates rely on folk knowledge and value practical viewpoints, whereas intuitives value imagination and are future-oriented (Jung, 1971).

While making decisions, people either rely primarily on thought or feeling to guide them (Jung, 1971). "Thinkers tend to make decisions based on logic and ideas whereas feelers tend to make decisions based more on relation to people and how their actions affect others, especially their feelings" (Shindler & Yang, 2003, p. 2). Further, feelers dislike conflict and stimulate enthusiasm among groups (Shindler & Yang, 2003). Finally, thinkers are unprejudiced in conflict and require reason when making decisions (Shindler & Yang, 2003).

Judgers and perceivers differ in their orientation to the external environment (Jung, 1971). Perceivers struggle to make decisions and prefer to maintain several options for action (Shindler &Yang, 2003). Perceivers are spontaneous people and tolerate the differences they have with others, while judgers are decisive rather than curious and can suffer from rash decision-making (Shindler &Yang, 2003). Shindler and Yang (2003) have taken Jung's personality profiles and applied them to learning styles vs. personality styles alone.

Purpose, Objectives, and Hypotheses

The purposes of this study were to explore the interaction between learning outcomes and learning style of Oklahoma FFA Alumni Leadership Camp participants (campers), and investigate the relationship between campers' attitudes about camp and their learning style. The following objectives were formulated to accomplish the purposes:

1. Determine the preferred learning style of campers.

2. Determine relationships between campers' preferred learning style and their attainment of knowledge associated with the curriculum taught during the camp.
3. Determine the relationship between campers' learning style and their retention of knowledge gained during the camp.
4. Determine if a relationship exists between campers' learning style and their attitude about the camp experience.

The following hypotheses were formulated for the second and third objectives and guided the statistical analysis of the study:

Objective 2

H_0: No difference existed between pretest and posttest scores of campers with differing learning styles.

H_0: No interaction existed between pretest and posttest scores of campers and their personal learning style.

Objective 3

H_0: No difference existed between pretest, posttest, and delayed posttest scores of campers with differing learning styles.

H_0: No interaction existed between pretest, posttest, and delayed posttest scores of campers and their personal learning style.

Methodology

Population and Sampling

The target population for this study was FFA members who participated in the Oklahoma FFA Alumni Leadership Camp, summer 2011. Because the target population exceeded 1,500 (N = 1,543), a random sample was drawn to select the subjects. Individual campers were assigned a number during the camp registration process and matched to a list of randomized numbers generated using a web-based randomization tool (randomizer.org).

Although a sample of 60 was needed to reach maximum statistical power with a moderate effect size (Faul, Erdfelder, Lang, & Buchner, 2007), generalization to the population was desired; therefore, a sample size larger than 60 was necessary. Krejcie and Morgan's (1970) *Table for Determining Sample Size from a Given Population* was utilized to determine the appropriate sample size (n = 310) for the study population (N = 1,543). To ensure a final sample size large enough to generalize study results, we chose to randomly sample 435 campers after approval from the Institutional Review Board at Oklahoma State University. Ultimately, the sample was reduced to 395 due to a lack of parental consent from 40 campers. In all, 344 FFA members participated in the study while at camp, resulting in an 87% response rate. According to Lindner, Murphy, and Briers (2001), a response rate at this level requires no further procedures to control for non-response error.

Research Design

The objectives of this study were met by using a split-plot factorial repeated measures quasi-experimental design. The study was deemed quasi-experimental because campers were not randomly assigned to treatment groups (Kirk, 1995) due to the natural occurrence of learning styles among individuals. According to Field (2009), study participants are required to complete all levels of the quasi-experiment when using the repeated-measures research design. The three levels of this repeated-measures quasi-experiment were a pretest, posttest, and delayed posttest. To meet the objectives of the study, student learning style was identified, student cognitive gain and retention was determined by pretest, posttest, and delayed posttest scores, and students were split into four test groups based on their preferred learning styles to determine if their individual style affected their level of cognitive gain and retention of material taught during small group breakout sessions. Small groups convened seven times during the four-day camp, which resulted in 12 hours of treatment. Each small group was led by a post high school (age 18-19), former FFA member known as a Small Group Leader (SGL).

Steinberg (2008) defined an independent variable as "the treatment or condition that the researcher expects will make subjects perform either better or worse on some measure of be-

havior" (p. 142). The independent variables in the quasi-experimental component were the four learning styles: (a) Action Oriented Realists, (b) Action Oriented Innovators, (c) Thoughtful Realists, and (d) Thoughtful Innovators (Shildler & Yang, 2003). Camper attitude scores pertaining to evaluation, potency, and activity of camp also served as independent variables in secondary data analysis procedures designed to meet the fourth research objective.

Dependent variables are "the measured outcome or behavior, which the researcher then assumes is attributable to the treatment" (Steinberg, 2008, p. 142). Three repeated measures of knowledge related to communications served as the dependent variables for this study. Those measures were collected in the form of a pretest, posttest, and delayed posttest.

In experimental design research, there are eight primary threats to internal validity: (a) history, (b) maturation, (c) testing, (d) instrumentation, (e) statistical regression, (f) differential selection of participants, (g) mortality, and (h) selection-maturation interaction (Gay, Mills, & Airasian, 2009). Three tactics for overcoming threats to internal validity in experimental research are random assignment of subjects, random selection of subjects, and researcher control over other nuisance variables (Gay et al., 2009). Although extensive precautions were taken to ensure that threats to internal validity were addressed, some threats were unavoidable due to the quasi-experimental nature of the study. Campers were not randomly assigned to treatment groups; therefore, nuisance variables could have skewed the data.

Data Collection Instruments

Through a thorough review of the literature, we determined that the Paragon Learning Style (PLSI), a widely used 52-item instrument, was the most appropriate learning style inventory to meet the objectives of the study (Shindler & Yang, 2003). Items of the PLSI were constructed using a single question or stem statement with two opposing answers or statement choices. This standardized instrument has been reviewed continuously to increase reliability and improve validity for more than 10 years. Shindler and Yang (2003), creators of the instrument, reported split-half reliability coefficients between .90 and .94 for each of the four dimensions. Based on this report, the instrument was considered valid and reliable.

An original instrument was created to assess camper's cognitive gain of concepts associated with the curriculum taught during camp small group breakout sessions. The instrument, Camp Communications Content Examination (CCCE), was a criterion-referenced test. State FFA staff and Alumni Camp planners collaborated with us to identify objectives of the curriculum, which focused on personal communication, team communication, and family communication. The CCCE was composed of 17 multiple-choice items.

A panel of experts comprised of two leadership curriculum specialists, three agricultural education teacher educators, and three students from high schools in Oklahoma, reviewed the CCCE for face and content validity. Creswell (2008) explained, "content validity is the extent to which the questions on the instrument and the scores from these questions are representative of all the possible questions that a researcher could ask about the content or skills" (p. 172). Two leadership curriculum specialists were included on the review panel primarily for the purpose of reviewing each test item for content validity. Both of the leadership curriculum specialists had experience writing curriculum and assessments for FFA leadership seminars and conferences such as Made for Excellence and the Washington Leadership Conference. Teacher education faculty members in agricultural education were also included on the panel due to their expertise in constructing summative education assessments. Panel members were tasked with determining if the test items were constructed appropriately. Finally, three Oklahoma high school students were asked to review the CCCE primary for face validity. The three students reviewed the instrument to ensure that all test items and directions were written at an age-appropriate level and were easy to comprehend. After two rounds of reviews and feedback from the panel, minor changes were made to the instrument. As a result of these procedures, the CCCE was deemed a valid instrument.

Reliability "is the ability of the measure to produce the same results under the same condi-

tions" (Field, 2009, p. 12). Wiersma and Jurs (1990) suggested eight methods to establish reliability of a criterion-referenced examination including homogeneous items, discriminating items, enough items, high quality copying and format, clear directions for the students, a controlled setting, motivating introduction, and clear directions for the scorer. To ensure test reliability, we carefully considered and applied these eight directives when constructing the CCCE. Multiple sources in the literature described the relevant function of reliability indices in criterion-referenced tests (Kane, 1986; Lang, 1982; Popham & Husek, 1969; Wiersma & Jurs, 1990). The Kuder-Richardson (*KR20*) formula (Cronbach, 1970), a test for internal consistency used commonly in association with criterion-referenced exams, was used to test the CCCE for internal consistency. The CCCE produced a coefficient of .52 (*KR20*), which is acceptable for criterion-referenced exams (Kane, 1986). Based on these efforts, the CCCE was determined to be a valid and reliable instrument.

We developed the Alumni Camp Attitude Assessment (ACAS) semantic differential (Osgood, Suci, & Tannenbaum, 1965) to determine the attitudes of campers regarding the camp experience in the areas of evaluation, potency, and activity. Following the advice of Isaac and Michael (1995), we chose five adjective pairs for each of the three factors, and varied the arrangement of each adjective pair so that the potent, evaluative, and active ends of the scales were positioned on both the left and right positions of the seven-point scale to avoid the development of response patterns. Fifteen pairs of polar adjectives were chosen to be included in the sematic differential. According to Isaac and Michael (1995), an attitude score between 1.00 and 3.99 is considered negative, a score between 4.00 and 4.99 is considered neutral, and a score between 5.00 and 7.00 is considered positive.

The ACAS was reviewed for face and content validity by the same panel of experts that reviewed the CCCE. All adjective sets were chosen from the list of factor-analyzed adjective pairs developed by Osgood et al. (1965) and were standardized. We chose to conduct a post-hock reliability analysis of the ACAS because the instrument was administered to students rather than adults. The ACAS produced a reliability coefficient of .70 (Cronbach's Alpha).

Procedures

During the registration period for each of the four sessions of camp, randomly selected campers were hand delivered a packet containing two instruments: a content examination designed to measure cognitive gain of camp curriculum; and the Paragon Learning Style Inventory (PLSI) (Shindler & Yang, 2003), designed to measure camper learning styles. This administration served as the pretest. Before leaving camp, the same campers were asked to complete the CCCE as a posttest and the ACAS.

Six months later (January 2012), participants were mailed the CCCE as a delayed posttest measure. The decision to administer the CCCE six months after the camp experience was supported in educational literature (Berti & Andriolo, 2012). As supported in literature, the results of the delayed posttest were used to determine the level of cognitive retention (Fleming & Alexander, 2001; Hall & Edmondson, 1992; Ramraje & Sable, 2011). Dillman (2000) explained that survey implementation has a much greater bearing on response rate than the actual design and quality of the questionnaire and outlined five elements for achieving high response rates: (a) creation of a respondent-friendly questionnaire, (b) four separate mailings to each subject by first class mail, with an additional special contact, (c) return envelopes with first class stamps, (d) personalized mailings to each subject, and (e) prepaid incentives. Dillman's (2000) design was followed to contact the teachers of each subject rather than to communicate with each camper individually.

Two hundred and forty-three campers completed and returned the delayed posttest resulting in a 70.63% response rate. The best method to control for nonresponse error, a threat to external validity, is to compare those who responded to those who did not (Lindner et al., 2001). We contacted agricultural education teachers who did not return their students' instruments by telephone to request the completed instruments from the sample. Twenty instruments were completed and received through this process, meeting the minimum standard for the number

of subjects needed to represent non-respondents (Lindner et al., 2001). A *t*-test analysis showed no significant differences between the respondents and non-respondents [t (261) = -.56, p = .58]. It was, therefore, determined that the respondents were representative of the population and the results can be generalized to the population.

Data Analysis

All data were analyzed using Statistical Package for Social Sciences (SPSS) version 20 for Macintosh computers. To reduce human error, we also used SPSS to calculate individual camper scores for all three levels of the CCCE and to calculate mean scores for the three attitude factors associated with the ACAS. The split-plot factorial (SPF) design was used to meet the second and third objectives and was the primary analysis procedure. SPF designs test for between-subjects effects and within-subjects effects (Kirk, 1995). This study employed a SPF-4x2 design that tested differences among four between-subjects groups (learning styles), differences between two repeated measures (pretest and posttest scores) and determined if an interaction existed between learning styles and test scores. We also utilized an SPF-4x3 design, which included one additional repeated measure (delayed posttest) to test for between-subjects effects and within-subjects effects when the delayed posttest was added to the analysis. Field (2009) explained that a test for sphericity is not necessary when an analysis includes only two repeated measures. Therefore, Mauchly's (1940) sphericity test was only used as part of the SPF-4x3 analysis. Mauchly's (1940) test for sphericity was non-significant (p = .43); therefore, the assumption of sphericity was met. Furthermore, Levene's (1960) test for homogeneity of variance was used to determine that there were no significant differences between the variances of each group. Levene's (1960) test produced a p value of .86 when comparing group variances for the pretest, a p value of .14 when comparing group variances for the posttest, and a p value of .65 when comparing group variances for the delayed posttest.

The fourth objective was analyzed using a one-way ANOVA to test if relationships existed between campers' preferred learning style and their attitude score. Appropriate statistical tests were used to determine that all assumptions were met during the secondary data analysis procedures.

Partial eta squared (η_p^2) is a suitable statistic to calculate effect size in a repeated measures design with more than two independent variables (Richardson, 2011). Cohen (1965) explained that the partial eta squared statistic (η_p^2) is appropriate because other non-error causes of variation are partialed out of the analysis. Therefore, partial eta squared (η_p^2) was utilized to report effect sizes for both SPF analyses.

Findings

The first objective was to determine the preferred learning style of campers. Approximately 60% of the respondents possessed an extraverted learning style (f = 206). The most common learning style among campers was Action Oriented Realists (f = 108; 31.40%) followed by the second extraverted learning style, Action Oriented Innovators (f = 98; 28.48%). Thoughtful Realists, an introverted learning style, accounted for 28.40% (f = 97) of the sample while 11.92% (f = 41) were Thoughtful Innovators, an introverted learning style.

The second objective determined relationships between campers' preferred learning style and their attainment of knowledge associated with the curriculum taught during camp. The size of each treatment group and the group mean pre-test and post-test score can be found in Table 1.

Table 1

Mean Raw Pretest and Posttest Scores and Percentages that were Correct by the Treatment Group (*n* = 344)

	Treatment Group	*f*	*M*	*SD*	% Correct
Pre-Test	Action Oriented Realists (ES)	108	5.12	1.93	30.12
	Action Oriented Innovators (EN)	98	5.18	1.85	30.47
	Thoughtful Realists (IS)	97	5.34	1.92	31.41
	Thoughtful Innovators (IN)	41	5.20	2.09	30.59
	Overall	344	5.21	1.92	30.65
Post-Test	Action Oriented Realists (ES)	108	10.13	2.74	59.59
	Action Oriented Innovators (EN)	98	9.52	2.37	56.00
	Thoughtful Realists (IS)	97	9.64	2.64	56.71
	Thoughtful Innovators (IN)	41	9.83	2.61	57.82
	Overall	344	9.78	2.59	57.53

There was no difference between pretest and posttest scores of Oklahoma FFA Alumni Leadership Camp attendees with differing learning styles. Between-subjects effects, learning styles, were not significant [$F(3, 1) = .38$, $p = .77$]. Levene's test of equality of error variances was non-significant; therefore, equal variances were assumed. Because there were only two repeated measures, Mauchly's test of sphericity was not necessitated (Field, 2009). The observed power for the statistical analysis was low (.13) due to a negligible effect size ($\eta_p^2 = .003$).

There was no interaction between pretest and posttest scores of Oklahoma FFA Alumni Leadership Camp attendees and their personal learning style. The interaction between learning style and time was not significant [$F(3, 3) = 1.52$, $p = .21$]. Levene's test of equality of error variances was non-significant; therefore, equal variances were assumed. Although the analysis employed a large *n*, the observed power for the statistical analysis was moderate (.40) due to a negligible effect size ($\eta_p^2 = .01$).

The third objective sought to determine the relationship between campers' learning style and their retention of knowledge gained during the camp. Table 2 displays the size of each treatment group and the group mean pre-test, post-test, and delayed post-test score.

Table 2
Mean Raw Pretest, Posttest, and Delayed Posttest Scores and Percentages that were Correct by the Treatment Group (*n* = 243)

	Treatment Group	*n*	*M*	*SD*	% Correct
Pre-Test	Action Oriented Realists (ES)	76	4.97	1.97	29.24
	Action Oriented Innovators (EN)	68	5.16	1.84	30.35
	Thoughtful Realists (IS)	67	5.51	1.94	32.41
	Thoughtful Innovators (IN)	32	5.41	1.88	31.82
	Total	243	5.23	1.92	30.76
Post-Test	Action Oriented Realists (ES)	76	10.07	2.89	59.24
	Action Oriented Innovators (EN)	68	9.30	2.24	54.71
	Thoughtful Realists (IS)	67	9.73	2.67	57.24
	Thoughtful Innovators (IN)	32	10.03	2.44	59.00
	Overall	243	9.75	2.61	57.35
Delayed Post-Test	Action Oriented Realists (ES)	76	7.38	2.57	43.41
	Action Oriented Innovators (EN)	68	6.76	2.21	39.76
	Thoughtful Realists (IS)	67	7.19	2.43	42.29
	Thoughtful Innovators (IN)	32	7.41	2.28	43.59
	Total	243	7.16	2.40	42.12

Note. Participant mortality occurred between posttest and delayed posttest completion.

There was no difference between pretest, posttest, and delayed posttest scores of Oklahoma FFA Alumni Leadership Camp attendees with differing learning styles. The between subjects-effects, learning styles, were not statistically significant [$F(3, 1) = 1.12$, $p = .34$]. Levene's test of equality of error variances was non-significant; therefore, equal variances were assumed. Mauchly's test of sphericity was non-significant. Therefore, sphericity was assumed. The observed power for the statistical analysis was low (.30) due to a negligible effect size ($\eta_p^2 = .01$).

There was no interaction between pretest, posttest, and delayed posttest scores of Oklahoma FFA Alumni Leadership Camp attendees and their personal learning style. The interaction between learning style and time were not significant [$F(3, 2) = 1.02$, $p = .41$]. Levene's test of equality of error variances was non-significant, and thus, equal variances were assumed. The observed power for the statistical analysis was moderate (.41) due to a negligible effect size ($\eta_p^2 = .01$).

The fourth objective was to determine if a relationship exists between campers' learning style and their attitude about the camp experience. Table 3 displays the mean attitude scores of campers by their treatment group (learning style). Mean learning style scores pertaining to camper evaluation of the camp experience were significantly different [$F(3, 340) = 3.11$, $p = .03$]. A pairwise comparisons analysis revealed that Action Oriented Realists (ES) evaluated the camp experience significantly higher than Thoughtful Realists (IS) or Thoughtful Innovators (IN). No statistically significant differences existed when comparing treatment group mean attitude scores associated with the potency of the camp experience [$F(3, 340) = .73$, $p = .54$]. Differences among mean group scores associated with activeness of the camp experience were statistically significant [$F(3, 340) = 3.30$, $p = .02$]. A pairwise comparison indicated that Action Oriented Realists (ES) and Action Oriented Innovators (EN) rated the activity of camp significantly higher than did the Thoughtful Realists (IS). Statistically significant differences existed among overall mean attitude scores by treatment group [$F(3, 340) = 3.22$, $p = .02$]. A pairwise comparisons analysis indicated that the overall attitude scores of Action Oriented Realists (ES) and Action Oriented Innovators (EN)

were statistically significantly higher than the scores of Thoughtful Realists (IS) and Thoughtful Innovators (IN).

Table 3

Mean Camper Attitude Scores by Treatment Group (*n* = 344)

Learning Style	Evaluation of Camp[a]	Potency of Camp[a]	Activity of Camp[a]	Overall Attitude[a]
Action Oriented Realists (ES)	6.67	4.97	5.48	5.71
Action Oriented Innovators (EN)	6.62	5.03	5.53	5.73
Thoughtful Realists (IS)	6.49	4.95	5.23	5.58
Thoughtful Innovators (IN)	6.45	4.86	5.33	5.55
Total	6.58	4.97	5.42	5.66

[a]Scale: 1.00 – 3.99 = negative attitude; 4.00 – 4.99 = neutral attitude; 5.00 – 7.00 = positive attitude.

Conclusions, Implications, and Recommendations

In conclusion, campers' learning styles mirror roughly the learning styles of the general population as reported by Shindler and Yang (2003). As with the general population, camper learning styles are varied and in proportion to society at large. Campers from all four learning styles were attracted to the camp and had an overall positive experience. Further research is needed to analyze the learning styles of FFA members who chose to attend camp more than once to determine if a particular type of learner is attracted to the format and programs of camp. According to Jung's (1971) type theory, extraverted learners are more comfortable in a camp setting than introverts due to the considerable emphasis on group work, intense large group interactions. Extroverts may be overrepresented in the return camper category.

Learning style had no effect on the amount of information campers learned during small group breakout sessions. Therefore, we failed to reject both null hypotheses associated with the second objective. This conclusion contradicts Jung's (1971) psychological type theory as introverts are predicted to experience a learning barrier when participating in a group-learning environment as was created during small group breakout sessions. Theory suggests that small groups are more satisfying for extraverted learners who thrive in group environments and learn best by sharing their thoughts with others (Jung, 1971). The findings of this study add to the divergent field of literature pertaining to learning style in both agricultural education as well as other educational disciplines (Cano, et al., 1992; Garton et al., 1999; Marrison & Frick, 1994; Thornton, Haskell, & Libby, 2006; Whittington & Raven, 1995) and confirms the findings of Marrison and Frick (1994) who found that learning style produced no significant differences in academic achievement.

Preferred learning style had no effect on the amount of information learned or retained by campers when comparing mean scores of pretests, posttests, and delayed posttests. Further, there was no interaction between time and learning style, which indicates that learning style did not impact the amount of information campers retained six months later. Therefore, we failed to reject both null hypotheses formulated for objective three. We conclude that learning style was not a factor in student learning outcomes or retention in a non-formal camp environment. This conclusion aligns with the findings of Hansen and Stansfield (1982), McDonald (1984), Mehdikhani (1983), and Paradise and Block (1984) who also found that learning style did not impact student learning outcomes in formal education environments.

Attitudes regarding camp were significantly different among learning style groups. Extroverts evaluated the camp higher than introverts, had a more positive attitude, and rated the activity of the camp higher than introverts. All four

types of learners rated potency equally, which agrees with the findings associated with objectives two and three. Campers' preferred learning style did not influence their learning outcomes or their attitude pertaining to the potency of camp. We conclude that extroverts, who are drawn to socially charged situations, benefited more from camp in the affective domain than did introverts. Introverts enjoy working alone, need more quiet time for reflection, and are more satisfied with fewer social interactions than extroverts (Shindler & Yang, 2003). Research indicates that attitude development is profoundly important, perhaps more important than cognitive development, when preparing students for their post-school lives (Popham, 2009). We recommend that camp directors attend better to the unique social needs of introverts by planning more activities to be completed solo or in very small groups of two people. For example, camp planners could design a culminating individual project that provides an opportunity for campers to reflect on the camp experience and create a tangible product that exhibits their own personal growth. These conclusions and recommendations, when appropriate, should be transferred to other FFA non-formal education programs at the local, state, and national levels.

References

Berti, A. E., & Andriolo, A. (2001). Third graders' understanding of core political concepts (law, nation-state, government) before and after teaching. *Genetic, Social, and General Psychology Monographs, 127*(4), 346 – 377.

Brown, N. R., & Terry, Jr. R. (2013). The effects of group leader learning style on student knowledge gain in a leadership camp setting: A repeated-measures experiment. *Journal of Agricultural Education, 54*(2), 44 – 56. doi: 10.5032/jae.2013.02044

Cano, J., & Garton, B. L. (1994). The relationship between agricultural preservice teachers' learning styles and performance in a methods of teaching agriculture course. *Journal of Agricultural Education, 35*(2), 6 – 10. doi: 10.5032/jae.1994.02006

Cano, J., Garton, B. L., & Raven, M. R. (1992). The relationship between learning and teaching styles and student performance in a methods of teaching agriculture course. *Journal of Agricultural Education, 33*(3), 16 – 22. doi:10.5032/jae.1992.03016

Cano, J., & Metzger, S. (1995). The relationship between learning style and levels of cognition of instruction of horticulture teachers. *Journal of Agricultural Education, 36*(2), 36 – 43. doi:10.5032/jae.1995.02036

Cohen, J. (1965). Some statistical issues in psychological research. In B. B. Wolman (Ed.), *Handbook of clinical psychology* (pp. 95 – 121). New York, NY: McGraw-Hill.

Connors, J. J., Falk, J. M., & Epps, R. B. (2010). Recounting the legacy: The history and use of FFA camps for leadership and recreation. *Journal of Agricultural Education, 51*(1), 32 – 42. doi:10.5032/jae.2010.01032

Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Pearson Education, Inc.

Cronbach, L. J. (1970). Essentials of psychological testing (3rd ed.). New York, NY: Harper & Row.

DeBello, T. C. (1990). Comparison of eleven major learning styles models: Variables, appropriate populations, validity of instrumentation and the research behind them. *Journal of Reading, Writing and Learning Disabilities, 6,* 203 – 222. doi: 10.1080/0748763900060302

Dillman, D. A. (2000). *Mail and internet survey's: The tailored design method.* New York, NY: John Wiley & Sons, Inc.

Dyer, J. E., & Osborne, E. (1996). Effects of teaching approach on achievement of agricultural education students with varying learning styles. *Journal of Agricultural Education, 37*(3), 43 – 51. doi:10.5032/jae.1996.03043

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39,* 175 – 191. doi: 10.3758/BF03193146

Field, A. (2009). *Discovering statistics using SPSS.* Los Angeles, CA: Sage.

Fleming, V. M., & Alexander, J. M. (2001). The benefits of peer collaboration: A replication with a delayed posttest. *Contemporary Educational Psychology, 26,* 588 – 601. doi: 10.1006/ceps.2001.1082

Friedel, C. R., & Rudd, R. D. (2006). Creative thinking and learning styles in undergraduate agriculture students. *Journal of Agricultural Education, 47*(4), 102 – 111. doi: 10.5032/jae.2006.04102

Garton, B. L., Spain, J. N., Lamberson, W. R., & Spiers, D. E. (1999). Learning styles, teaching performance, and student achievement: A relational study. *Journal of Agricultural Education, 40*(3), 11 – 20. doi:10.5032/jae.1999.03011

Gay, L. R., Mills, G. E., & Airasian, P. W. (2009). *Educational research: Competencies for analysis and applications.* Upper Saddle River, NJ: Pearson.

Gregorc, A. F. (1982). An adult's guide to style. Columbia, CT: Gregorc Associates, Inc.

Hall, V. C., & Edmondson, B. (1992). Relative importance of aptitude and prior domain knowledge on immediate and delayed posttests. *Journal of Education Psychology, 84*(2), 219 – 223. doi: 10.1037/0022-0663.84.2.219

Hansen, J., & Stansfield, C. (1982). Student-teacher cognitive styles and foreign language achievement. A preliminary study. *Modern Language Journal, 66*(3), 263 – 273. doi:10.1111/j.1540-4781.1982.tb06988.x

Isaac, S., & Michael, W. B. (1995). *Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences.* San Diego, CA: EdITS Publishers.

Jung, C. G. (1971). *Psychological types* (R. F. C. Hull, & H. G. Baynes, Trans.). Princeton, NJ: Princeton University Press. (Original work published 1923).

Kane, M. T. (1986). The role of reliability in criterion-referenced tests. *Journal of Educational Measurement, 23*(3), 221 – 224. doi: 10.1111/j.1745-3984.1986.tb00247.x

Kasworm, C. E., Rose, A. D., & Ross-Gordon, J. M. (Eds.). (2010). *Handbook of adult and continuing education.* Los Angeles, CA: Sage.

Kirk, R. E. (1995). *Experimental design.* Pacific Grove, CA: Brooks/Cole Publishing Company.

Kolb, A. Y., & Kolb D. A. (2009). The learning way: Meta-cognitive aspects of experiential learning. *Simulation & Gaming, 40*(3), 297 – 327. doi: 10.1177/1046878108325713

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall, Inc.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607 – 610. doi: 10.1177/001316447003000308.

Lambert, M. D., Smith, A. R., & Ulmer, J. D. (2010). Factors influencing relational satisfaction within an agricultural education mentoring program. *Journal of Agricultural Education, 51*(1), 64 – 74. doi: 10.5032/jae.2010.01064

Lang, H. (1982). Criterion-referenced tests in science: An investigation of reliability, validity, and standards-setting. *Journal of Research in Science Teaching, 19*(8), 665 – 674. doi: 10.1002/tea.3660190806

Levene, H. (1960). Robust tests for equality of variances. In I. Olkin, S. Ghurye, W. Hoeffding, W. Madow, & H. Mann (Eds.), *Contributions to probability and statistics: Essays in honor of Harold Hotelling* (pp. 278 – 291). Stanford, CA: Stanford University Press.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43 – 53. doi:10.5032/jae.2001.04043

Loo, R. (1999). Confirmatory factor analyses of Kolb's Learning Style Inventory (LSI-1985). *British Journal of Educational Psychology, 69*, 213 – 219. doi:10.1348/000709999157680

Marrison, D. L., & Frick, M. J. (1994). The effect of agricultural students' learning styles on academic achievement and their perceptions of two methods of instruction. *Journal of Agricultural Education, 35*(1), 26 – 30. doi:10.5032/jae.1994.01026

Mauchly, J. W. (1940). Significance test for sphericity of a normal n-variate distribution. *The Annals of Mathematical Statistics, 11*(2), 204 – 209. doi: 10.1214/aoms/1177731915

McCrea, A. (2011). *Vision of blue heart of gold: A history of Oklahoma FFA.* Maysville, MO: Blake & King.

McDonald, E. R. (1984). The relationship of student and faculty field dependence/independence congruence to student academic achievement. *Educational and Psychological Measurement, 44*, 725 – 731. doi: 10.1177/0013164443022

Mehdikhani, N. (1983). *The relative effects of teacher teaching style, teacher learning style, and student learning style upon student academic achievement* (Doctoral dissertation). Retrieved from ProQuest. (8314893)

Miller, A. (1991). Personality types, learning styles and educational goals. *Educational Psychology, 11*(3/4), 217 – 238. doi: 10.1080/0144341910110302

National FFA Organization. (2008). *Official FFA Manual.* Indianapolis, IN: National FFA Organization.

Oltman, P. K., Raskin, E., & Witkin, H.A. (1971). *Group embedded figures test.* Palo Alto, CA: Consulting Psychologists Press.

Osgood C. E., Suci, G. J., & Tannenbaum, P. H. (1965). *The measurement of meaning.* Urbana, IL: University of Illinois Press.

Paradise, L. V., & Block, C. (1984). The relationship of teacher-student cognitive style to academic achievement. *Journal of Research and Development in Education, 17*(4), 57 – 61.

Popham, W. J. (2009). Assessing student affect. *Educational Leadership, 66*(8), 85 – 86.

Popham, W. J., & Husek, T. R. (1969). Implications of criterion-referenced measurement. *Journal of Educational Measurement, 6*(1), 1 – 9. doi: 10.1111/j.1745-3984.tb00654.x

Ramraje, S. N., & Sable, P. L. (2011). Comparison of the effect of post-instruction multiple-choice and short-answer tests on delayed retention learning. *Australasian Medical Journal, 4*(6), 332 – 339. doi: 10.4066/AMJ.2011.727

Richardson, J. T. E. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review 6,* 135 – 147. doi: 10.1016/j.edurev.2010.12.001

Shindler, J., & Yang, H. (2003). Paragon Learning Style Inventory [Instrument and interpretation material]. Unpublished instrument. Retrieved from http://www.calstatela.edu/faculty/jshindl/plsi/index.html

Steinberg, W. J. (2008). *Statistics Alive!* Los Angeles, CA: Sage Publications.

Thornton, B., Haskell, H., & Libby, L. (2006). A comparison of learning styles between gifted and non-gifted high school students. *Individual Differences Research, 4*(2), 106 – 110.

Whittington, M. S., & Raven, M. R. (1995). Learning and teaching styles of student teachers in the northwest. *Journal of Agricultural Education, 36*(4), 10 – 17. doi: 10.5032/jae.1995.04010

Wiersma, W., & Jurs, S. G. (1990). *Educational measurement and testing* (2nd ed.). Needham Heights, MA: Allyn and Bacon.

NICHOLAS R. BROWN is an Evaluator and Instructor of Agricultural Education in the Department of Agricultural Education, Communications and Leadership at Oklahoma State University, 457 Agricultural Hall, Stillwater, OK 74078, nick.brown@okstate.edu.

ROBERT TERRY, JR. is a Professor and Head in the Department of Agricultural Education, Communications and Leadership at Oklahoma State University, 449 Agricultural Hall, Stillwater, OK 74078, rob.terry@okstate.edu.

KATHLEEN D. KELSEY is a Professor and Head in the Department of Agricultural Leadership, Education and Communication at the University of Georgia, 142A Four Towers, 405 College Station Road, Athens, GA 30602, kaykelseyuga@gmail.com.