

## **Critical Thinking Skills of FFA Leaders**

John C. Ricketts, University of Georgia  
Rick Rudd, University of Florida

### **Abstract**

The primary purpose of this descriptive study was to describe the discipline-specific critical thinking skills in agriculture and leadership of selected youth leaders in the National FFA Organization. The researcher-developed critical thinking skills test, which was distributed online and by conventional mailing procedures, indicated that selected leaders in the FFA were competent critical thinkers. The youth leaders scored the highest on the Analysis sub-skill and the lowest on the Evaluation sub-skill. There were no significant differences between means, controlling for age and gender. However, GPA was significantly associated with the specific sub-skill of Analysis. Recommendations for practice include promoting FFA and agricultural education programs as a place where critical thinking can be developed; specific teacher training to improve the Evaluation skills of students; and concentration on critical thinking maintenance as well as critical thinking development. Further research should focus on comparing the average agricultural education student and/or FFA member to the sample in this study and attaining clarification concerning the relationship between certain demographics and critical thinking skill level.

## Introduction

Just what is critical thinking? One of the most relevant definitions of critical thinking to this study, as defined by Glaser (1941), is the "attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences; knowledge of the methods of logical inquiry and reasoning; and some skill in applying those methods" (pp. 5-6).

Richard Paul's (1995) definition added some detail to Glaser's description of critical thinking. Paul defined critical thinking as "A unique and purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking, taking charge of the construction of thinking, guiding the construction of the thinking according to [critical thinking] standards, and assessing the effectiveness of the thinking according to the purpose, criteria, and the standards [of thinking] (p. 21). Additionally, Rudd, Baker, and Hoover (2000) conducted a synthesis of research and purported that "Critical thinking is a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely" (p. 5).

Peter Facione (1990), who conducted a national Delphi study of experts to define critical thinking, provided the description of critical thinking used to guide this study because of its detail, descriptiveness, and conciseness in identifying specific skills needed for critical thinking. Facione wrote, "We understand critical thinking to be purposeful, self-regulatory judgment, which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (p.2).

Why is all of this important to youth leaders in the FFA or to anyone else? First, The Committee on Agricultural Education in Secondary Schools (National Research Council, 1988) concluded that redirecting agricultural education programs was in order if graduates of those programs were going to be successful in college or the workforce. One of the key points of the committee's report was their conclusion that ample opportunities should exist for practicing critical thinking skills with increasing variety and frequency. Additionally, critical thinking has a purpose. Paul (1995) stated that critical thinking mastery would help students take command of their lives by continually improving the quality of their life experiences. A report by the United States Department of Labor (1991) identified critical thinking as one of the foundational competencies in the Commission on Achieving Necessary Skills in What Work Requires of Schools: A SCANS Report for America 2000. Could critical thinking also be a foundational competency required of youth leaders?

Harvey Siegel (1988) provided the following rationale for including the concepts of critical thinking in youth education. Siegel believed critical thinking should be a part of the educational system because youth deserve to be able to think critically, because critical thinking is becoming a necessary component of living life, and because today's youth are tomorrow's leaders. Siegel believed that the first reason to include critical thinking as an

educational component is the moral obligation administrators and educators have to treat students (and everyone else) with respect. Additionally, he supported critical thinking as an educational component because of the competence it provides for living a productive life, which involves being able to think and reason about many different areas, for one cannot know all of the content that they should know at the start of a task. Finally, Siegel believed that critical thinking was necessary for democratic living. Ennis (1985) and Facione, Facione, and Giancarlo (1997) agreed that people in power and leadership positions should make decisions that consider all people, situations, and options.

### **Theoretical Framework**

Facione (1990) employed the Delphi Method to attain a consensus definition of critical thinking. His findings serve as the theoretical framework used for this study. Facione assembled a group of 40 experts in Philosophy, Psychology, and Education, recognized by their colleagues as having special experience and expertise in critical thinking instruction. The Delphi study consisted of six rounds of questions and responses. The findings of the Delphi Report are as follows:

- Critical thinking includes the dimensions of skill and disposition.
- There was consensus that critical thinking could be improved in several ways. The experts agreed that a person could critically examine and evaluate one's own reasoning processes, . . . learn how to think more objectively and logically, . . . expand their repertoire of those more specialized procedures and criteria used in different areas of human thought and inquiry, and . . . increase their base of information and life experience (p. 4).
- While critical thinking skills themselves transcend specific subjects or disciplines, exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts (p. 5).
- There is a critical spirit, a probing inquisitiveness, a keenness of mind, a zealous dedication to reason, and a hunger or eagerness for reliable information which good critical thinkers possess but weak critical thinkers do not seem to have . . . the affective dispositions are necessary for the critical thinking skills identified to take root . . . in students (p. 11).
- A good critical thinker . . . is habitually disposed to engage in, and to encourage others to engage in a wide range of contexts and for a wide variety of purposes. Although perhaps not always uppermost in mind, the rational justification for cultivating those affective dispositions which characterize the paradigm critical thinker are soundly grounded in critical thinking's personal and civic value. Critical thinking is known to contribute to the fair-minded analysis and resolution of questions. Critical thinking is a powerful tool in the search for knowledge. Critical

thinking can help people overcome the blind, sophistic, or irrational defense of intellectually defective or biased opinions. Critical thinking promotes rational autonomy, intellectual freedom and the objective, reasoned and evidence-based investigation of a very wide range of personal and social issues and concerns (p. 13).

The critical thinking skills identified by the panel of experts were Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation. A student adept at Interpretation is good at comprehending and expressing meaning about a wide variety of experiences, beliefs, procedures, rules, etc. A competent critical thinker using Analysis would be good at identifying the relationship between statements, questions, concepts or descriptions to express beliefs, judgments or reasons. Students excelling in Evaluation are competent at assessing credibility of statements and representations of others and assessing the logical strength of statements, descriptions or questions. Proficient students in the Inference skill have the ability to draw reasonable conclusions and/or hypotheses based on facts, judgments, beliefs, principles, concepts or other forms of representation. Explanation experts are good at stating and justifying the results of one's reasoning using each of the aforementioned abilities. Self-regulation, the last skill alludes to the ability of an individual to monitor their own personal cognitive activities to make sure that they are engaged in critical thinking.

Following the lead of Peter Facione (2000) and the *Test for Everyday Reasoning (TER)*, three critical thinking skills, Analysis, Evaluation, and Inference were the skills measured in this study. The TER did not specifically try to measure interpretation, explanation, and self-regulation. The skills used in this study (Analysis, Evaluation, and Inference) were selected to represent critical thinking skill because of their orientation to objective measurement; their indicativeness of all the critical thinking skills in the construct; and because subsequent studies have been conducted to validate their usage (Facione 1990; Jones et al., 1994; Giancarlo 1996).

Some philosophers (Paul, 1997) feel that critical thinking is an interdisciplinary skill, but others see critical thinking exhibited best in specific domains. According to Ennis (1989), empirical inquiry is needed to determine how certain aspects of critical thinking apply to a particular content area. He supported the need for contextual, domain, or subject specific critical thinking based on three observations: background knowledge is essential for making justified critical thinking judgments; critical thinking varies from field to field; and a full understanding of a field requires the ability to think critically in the field (Ennis, 1990, p.14).

Kintsch (1994), Tindal and Nolet (1995), Cheak (1999), and Halliday (2000) have tested Ennis's claims. They discovered that, indeed critical thinking is subject matter specific. They also agreed with Ennis that critical thinking should be evaluated with a discipline specific measure of critical thinking. This means that agricultural education students should be developing critical thinking skills in agriculture and leadership areas.

One would hope that great leaders are great thinkers, but are they? Many believe the National FFA Organization fosters great leaders (Ricketts, 1982; Townsend & Carter, 1983; Wingenbach & Kahler, 1997), and others believe that sound critical thinking is a component of good leadership (DesMaria, Yang, & Farzenhkia, 2000; Ricketts & Rudd, 2002; vanLinden & Fertman, 1998). This study examines the critical thinking skills of selected youth leaders in the National FFA Organization.

### Conceptual Framework

A conceptual model of critical thinking skill development was devised from the theoretical framework. The model is based on and adapted from the Triandis (1979) Model of Human Behavior. This study, which was part of a larger research project, focuses on critical thinking skill, and the facilitating factors; gender, grade point average, and age, within the context of leadership and agriculture. Critical thinking dispositions and leadership experience and training will be addressed in subsequent studies.

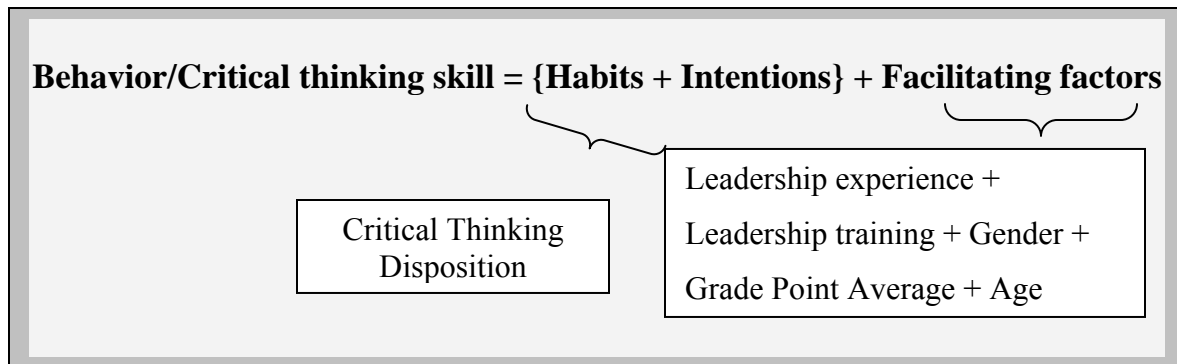


Figure 1.  
Conceptual model of critical thinking skills (behavior)

### Purpose and Objectives

The primary purpose of this study was to identify the critical thinking skill level of selected youth leaders in the National FFA Organization. Since the researchers believe that critical thinking is discipline specific, this study specifically evaluates the ability of selected youth leaders to think critically about the domains of leadership development and agriculture. To accomplish these purposes the following research objectives were used to guide this study:

1. Describe the age, gender, and GPA of selected leaders in the National FFA Organization.
2. Identify the critical thinking skill level of youth leaders in the National FFA Organization.
3. Identify differences in critical thinking skill based on the demographic variables: age, gender, and GPA.

## Methods and Procedures

The population for the study was all leaders in the National FFA Organization. The purposive sample, which was accessed from administrators of The National FFA Organization, was a list of 2002 National FFA Convention delegates specifically selected because of their leadership record in the FFA organization.

The researcher-developed instrument measured the discipline-specific critical thinking skills of Analysis, Inference, and Evaluation. Prior to pilot testing, a panel of experts in critical thinking and agricultural and leadership education checked the 90-item multiple-choice instrument for content and face validity. They trimmed the instrument down to 36 items for pilot testing. The pilot test was administered to 33 subjects at the Florida State FFA Convention. The pilot samples were purposively selected because of their similarities to the sample for this study. After pilot testing and item analysis, the instrument was reduced to 20 items. The Analysis construct contained eight multiple-choice items; the Evaluation construct contained seven items; and the Inference construct had five items. Cronbach's alpha for each sub-skill rested at 0.83 for Analysis, 0.66 for Inference, and 0.63 for Evaluation. These reliability ratings were deemed appropriate since Norris and Ennis (1989) recommended reliability ratings of 0.65 and 0.75 for any instrument testing a variety of critical thinking aspects.

Survey implementation followed Dillman's (2000) system of five compatible contacts. The instrument was initially available online, but non-respondents were eventually sent a paper copy. There were 229 responses from a population frame of 462 possible participants for a response rate of 50%. Seventeen of those respondents were removed from the database because of missing or erroneous data, which left ( $N = 212$ ) usable responses. To account for non-response, early respondents (online responses received after first mailing) were compared to late (paper responses received after reminder notices) respondents (Miller & Smith, 1983), and no significant differences were found.

Data were analyzed using the Statistical Package for the Social Sciences 10.0. Frequencies, means, and standard deviations were used to summarize and analyze the data. Independent samples t-tests, and analysis of variance procedures were used to determine the associations between critical thinking skills and the demographic variables. Omega<sup>2</sup> and Cohen's *d* (Cohen, 1977) were used to report effect sizes.

## Results

### *Objective 1 - Describe the age, gender, and GPA leaders in the National FFA Organization*

There were 212 subjects participating in the national study from the 50 states and Puerto Rico. The sample was 37.3% male ( $n = 79$ ), 60.4% female ( $n = 128$ ). Their ages ranged from 16 to 21. The average age of the participants was  $M = 17.81$ ,  $SD = .99$ . The participants' GPAs ranged from 2.0 to 5.0 with an average of  $M = 3.67$ ,  $SD = .39$ .

*Objective 2 - Identify the critical thinking skills of youth leaders in the National FFA.*

The mean critical thinking skill score was  $M = 227.86$ ,  $SD = 37.91$ . Critical thinking skill scores ranged from a low score of 67.86 to a maximum score of 300. The raw scores for Analysis ranged from a low of 25 to the highest possible score of 100. Inference scores ranged from 0 to 100, and Evaluation scores ranged from 14.29 to 100. All of the mean scores were above 70 for the possible range of scores (0 to 100); indicating the scores of the youth leaders may be high. The highest scores were recorded for the Analysis ( $M = 82.17$ ,  $SD = 15.12$ ) construct, meaning this sample of youth leaders were best at examining ideas, identifying arguments, and analyzing those arguments. Students also scored in the upper range for the Inference ( $M = 73.40$ ,  $SD = 20.74$ ) and Evaluation ( $M = 71.50$ ,  $SD = 17.70$ ) constructs.

*Objective 3 - Identify differences in critical thinking skill based on the demographic variables: age, gender, and GPA.*

Critical thinking skill scores ranged from 67.86 to 287.50 for male participants and from 120.36 to 300 for female participants. Consistent with the descriptive data in Table 1, females scored higher on total critical thinking skill than males. However, there was no statistical difference between males and females for Analysis,  $t(205) = -1.80$ ,  $p > 0.05$ ,  $d = 0.28$ , Inference,  $t(205) = -0.730$ ,  $p > .05$ ,  $d = 0.11$ , Evaluation,  $t(205) = .003$ ,  $p > 0.05$ ,  $d = 0.00$ , or total critical thinking skill score,  $t(205) = -1.12$ ,  $p > 0.05$ ,  $d = 0.17$ .

*Table 1.*

Mean subscale and critical thinking skill score by gender (N = 207)

Skill	Gender	n	M	SD
Analysis	Male	79	80.54	16.95
	Female	128	84.45	14.00
Inference	Male	79	71.90	21.37
	Female	128	74.06	20.29
Evaluation	Male	79	71.64	17.52
	Female	128	71.63	17.59
Total critical thinking	Male	79	224.08	40.84
	Female	128	230.14	35.81

Note: Five respondents failed to indicate whether they were male or female.

Sixteen year-old participants' critical thinking skill scores ranged from 170.36 to 300 out of 300. Seventeen, 18, 19, and 20-year-old participants had scores ranging from 67.86 to 287.50, 152.14 to 285.71, 175.71 to 285.71, and 159.64 to 287.50, respectively. The average Analysis, Inference, and Evaluation scores are detailed in Table 2.

Table 2

Mean subscale and critical thinking skill score by age (N = 208)

Age	n	Analysis		Inference		Evaluation		Total CT Skill	
		M	SD	M	SD	M	SD	M	SD
16	17	80.78	14.01	80.00	23.45	76.46	12.98	237.25	37.04
17	63	79.73	18.15	69.52	23.24	67.01	16.05	216.26	43.43
18	84	86.01	13.36	74.29	20.02	72.45	17.15	232.75	33.42
19	32	84.38	12.70	73.75	16.41	75.22	20.53	233.35	33.26
20	11	80.68	16.17	78.18	16.62	70.13	22.55	228.99	42.44
21	1	62.50	.	80.00	.	71.43	.	213.93	.

One-way analysis of variance procedures revealed that critical thinking score is not dependent on age. Analysis,  $F(6, 205) = 1.56, p > 0.05, \omega^2 = 0.02$ , Inference,  $F(6, 205) = .809, p > 0.05, \omega^2 = 0.01$ , Evaluation,  $F(6, 205) = 1.22, p > 0.05, \omega^2 = 0.01$ , and total critical thinking skill scores,  $F(6, 205) = 1.56, p > 0.05, \omega^2 = 0.02$ , did not statistically differ as a function of age.

Generally, total critical thinking skill scores consistently increased as GPA increased (Table 3). Statistically, the specific critical thinking skills of Inference,  $F(5, 206) = 1.89, p > 0.05, \omega^2 = 0.02$ , and Evaluation,  $F(5, 206) = 1.47, p > 0.05, \omega^2 = 0.01$  were not associated with GPA, but there was a small effect size. The increase in Analysis scores as GPA levels became higher, which was reported in Table 3 was statistically significant,  $F(5, 206) = 3.36, p < 0.05, \omega^2 = 0.05$ , and approaching a medium effect size (Keppel, 1991). The increase in overall critical thinking skill score as GPA increased was also significant and approaching a medium effect size,  $F(5, 206) = 3.11, p < 0.05, \omega^2 = 0.05$ .

Table 3

Mean critical thinking skill score by grade point average (N = 212)

GPA	n	Analysis		Inference		Evaluation		Total CT Skills	
		M	SD	M	SD	M	SD	M	SD
2.0-3.0	21	77.98	17.64	69.52	26.55	65.76	16.54	213.26	48.94
3.01-3.49	25	76.50	18.51	68.00	19.15	74.86	17.14	219.36	39.26
3.5-3.74	58	80.66	14.43	70.34	23.17	69.22	18.94	220.63	40.34
3.75-3.99	59	86.20	13.27	74.58	18.13	70.62	17.89	231.40	32.88
4.0	37	88.51	12.63	78.92	18.23	76.83	15.83	244.27	27.17
4.01-5.0	12	83.33	14.43	83.33	14.36	71.43	17.23	238.10	36.95

## **Conclusions**

Since this study purposively selected a sample of selected youth leaders in the National FFA Organization, one should not generalize findings beyond the 2002 National FFA Convention delegate participants. There were other limitations in the study. These include self-reported GPA's, which could or could not be correct and the fact that the grade point averages were both secondary and post-secondary scores. With these limitations in mind, and based on the findings of this study, the following conclusions were drawn concerning critical thinking skills and the independent demographic variables of the conceptual framework in Figure 1.

Relatively speaking, critical thinking skill scores of the National FFA delegates were high. Scores were in the upper end of the range for each of the sub-skills. National FFA delegates were most competent in the specific skill of Analysis, meaning they were best at examining ideas, identifying arguments, and analyzing those arguments. They were least competent in Evaluation, meaning they had some difficulty assessing claims related to agriculture and leadership.

According to the descriptive data, female scores were higher than male scores in terms of the critical thinking skill of Analysis, meaning females in the sample may be more adept at "identifying the intended and actual inferential relationships among statements, questions, concepts, descriptions of other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions" (Facione, 1998, p. 7). They also scored higher than males in their ability to make inferences, meaning females in the sample were more able to "identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation" (p. 9).

Additionally, just as Rudd, et al., (2000) had reported, an increase in age did not translate into more total critical thinking. The youngest age group scored the highest in critical thinking ability, and the group one year their senior scored the lowest. Student academic performance, measured by the participants' self-reported grade point average was associated with total critical thinking skills and the specific skill of Analysis.

## **Recommendations**

Based on the findings of this study, the following recommendations were made. Since the critical thinking abilities of the select group of individuals were high, and since other researchers (Rollins, 1988; Cano & Martinez, 1991; Cano, 1993) would agree that agricultural education students have the potential to be more competent at critical thinking than non agricultural education students, educators should promote their FFA and agricultural education programs as a place where critical thinking skill may be developed. The findings of this study suggest that the agricultural education curriculum is doing something right in terms of influencing the critical thinking abilities (Analysis) of students.

However, there seem to be some deficiencies in the critical thinking skills (Evaluation) of agricultural education students that could be accounted for if agricultural education made an effort to focus on them. Therefore, agricultural educators should incorporate teaching strategies that are intended to improve the critical thinking skills of students. Educators and leadership trainers should develop and use curricula, workshops, and activities that focus students' abilities to assess the credibility of statements and representations of others and assessing the logical strength of statements, descriptions, or questions. In other words, the specific critical thinking skill of Evaluation should be the most immediate focus of educators and leadership trainers. Additionally, in order to focus on Evaluation, critical thinking should be taught and evaluated in a contextually specific manner, for one cannot make value judgments if one does not understand the subject matter there are about to judge.

It is unclear whether females are actually more competent in critical thinking, but it has been demonstrated that the females in this study were at least as competent as males in their critical thinking skills. Agricultural educators, employers and business leaders should not discriminate based on gender, for this research and others have proven that females are just as capable as or possibly more capable of using critical thinking to solve problems and make decisions than males. Perhaps this is one of the reasons for the recent surge in female FFA leadership, as reported by Ricketts, Osborne, and Rudd (2003). They found that in the state of [a southeastern state], females represented the majority of FFA officer positions and outnumbered males in participation of Career Development Events in all but two events.

In this study critical thinking skill was lower for 17-year-old participants compared to 16-year old participants. Educators should not only concentrate on the development of critical thinking skills, but they should also concern themselves with the maintenance and retention of those abilities, as students progress through adolescence. Maybe critical thinking is tied to motivation, just as achievement, affiliation, and power (Rohs & Anderson, 2001). If so, then agricultural educators have, yet another reason to improve their ability to motivate students, as they get older. More research should follow to substantiate this assumption.

According to this study, competence in critical thinking was related to higher student academic performance. Though more research is needed to test for a causal relationship, another benefit of teaching critical thinking skills could be improved student academic achievement. Teachers concerned with having high achieving students that can more easily get into college and/or high skill/high wage jobs may need to consider teaching for critical thinking in their leadership development and agricultural education courses.

### **Suggestions for Additional Research**

Similar research should be conducted that assesses the critical thinking skills of agricultural education students not in the FFA and students not in agricultural education. The findings of this study of National FFA leaders should be compared with research that

assesses the critical thinking skills of agricultural education students not enrolled in the FFA and those not enrolled in agricultural education.

Gender seems to be a demographic variable that is evaluated secondarily. Because it is still unclear whether there are differences between males and females in regards to critical thinking skill, a focused study should be conducted that empirically defines the impact of gender on critical thinking. Specifically, future research should determine if critical thinking is tied to the recent prominence of female leaders in the National FFA Organization.

Research should be conducted to understand the extreme differences in critical thinking skill between 16-year-old and 17-year-old students. Are the differences related to grade level? Are they related to more or less exposure in a particular grade level? Are there more stresses on 17-year-old students than 16-year olds? The answers to these questions could help critical thinking curriculum development efforts.

Overall GPA was reported by the participants. Further research should evaluate GPA as it relates to content specific critical thinking skills tests. In this regard, research should also be conducted to determine if students who score better on leadership and agriculturally specific critical thinking skills tests perform better in leadership and agriculturally related courses.

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