*Journal of Agricultural Education, 55(5), 126-139.*
*doi: 10.5032/jae.2014.05126*

# Influence of FFA Activities on Critical Thinking Skills in Texas Three-Star FFA Chapters

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**Abstract**

*The purpose of this study was to determine the relationship of FFA activities on critical thinking skills of Texas FFA members in three-star FFA chapters. This descriptive study was conducted in eight purposively selected three-star FFA chapters throughout Texas. Three-star chapters are those chapters who have emerged as outstanding programs within the state based on the National FFA Chapter Awards Program guidelines. Seniors within each chapter were selected to complete a demographic survey and the Watson-Glaser Critical Thinking Appraisal® (WGCTA) instrument (Watson & Glaser, 2008a). The mean score for all FFA members who completed the survey was 39.85, which is considerably lower than the WGCTA norm group at 48.5 (Watson & Glaser, 2008b). With a mean score of 39.85, the FFA members who completed the WGCTA scored between the 20th and 25th percentile of high school students in the 12th grade (Watson & Glaser, 2008b). FFA members performed best on the Evaluation of Arguments subtest with a mean of 9.02 and scored lowest on the Inference subtest with a mean of 5.35. The only FFA activity that was an indicator of FFA members' critical thinking ability was the State Leadership Development (LDE) contest. Gender was an indicator of FFA members' critical thinking ability.*

**Key Words:** critical thinking, FFA activities, Three-Star FFA chapters

Many critical thinking theorists derived their philosophies from John Dewey. Dewey (1933) believed there were three attitudes mandatory for critical thinking to occur: open mindedness, responsibility, and wholeheartedness. There have been many critical thinking definitions developed over the years. Pascarella and Terenzini (1991) nicely combined several definitions and stated that critical thinking

…typically involves the individual's ability to do some or all of the following: identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, and evaluate evidence or authority. (p. 118)

Students benefit from critical thinking by building skills such as identifying relationships in concepts and decisions to express their beliefs, drawing reasonable conclusions, assessing the credibility of statements, and assessing the strength of information provided (Facione, 1990). The National Research Agenda of the American Association for Agricultural Education (Doerfert, 2011) noted skills needed for success in the 21st century workforce are far more complex than having a solid foundation in factual knowledge. An employee must be competent in communication

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skills, teamwork, and complex problem-solving skills to accommodate for an evolving career field (Doerfert, 2011). Critical thinking is one of the most important attributes for students' success in the 21st century (Huitt, 1998). Therefore, in order for students to be proficient in critical thinking skills they must obtain a level of competency over knowledge. According to Pithers and Soden (2000), students must learn more than the content to develop critical thinking skills. Students' ability to understand and use information is being emphasized (Richardson, 2003); and an increased amount and variety of opportunities for enhancing critical thinking skills should be provided (Ricketts & Rudd, 2005).

The National FFA Organization recognizes FFA chapters that successfully complete an annual Program of Activities (POA) in several ways through the National Chapter Award Program. The POA "includes a series of activities designed to encourage its members to grow as individuals, to work as part of a team, and to serve others" (National FFA, 2014). Chapters must complete activities within three divisions: student development, chapter development, and community development. Chapters must complete at least one activity each of five quality standards within each of the three divisions, for a total of 15 activities, in order to qualify for a state or national chapter award (National FFA, 2014).

According to the National FFA website (National FFA, 2014) the first recognition, the State FFA Superior Chapter Award, is given to chapters that documents the 15 required activities within their POA. Once a chapter has received the State FFA Superior Chapter Award, they are eligible to complete for State Gold, Silver, and Bronze Chapter Awards. The top three gold chapters, or the number equal to 10 percent of the state's total number of chapters whichever is higher, are then eligible to compete for the National FFA Star Chapter Awards. Within the National FFA Star Chapter Awards, these gold chapters are rated as either 3-star, 2-star, or 1-star ratings. Chapters with 3-star rankings are eligible to then compete for the National Model of Innovation Chapter Awards, National Model of Excellence Chapter Award, and if they are a middle school chapter, the National Outstanding Middle School Chapter Award. Thus, 3-star chapters are those chapters who have emerged as outstanding programs in the state and received the gold rating and are then evaluated on the quality standards outlined on the National FFA Chapter Awards Program application. Because only the top three chapters, or 10 percent, are recognized, these chapters are often the chapters that can documents substantive activities within each of the five quality standards in the student development, chapter development, and community development divisions simultaneously.

It is evident that agricultural educators and leadership trainers should provide a wide variety of educational stimulants to promote the enhancement of the potential critical thinking skills (Ricketts & Rudd, 2004; Rollins, 1990). Previous studies have determined critical thinking is an important part of agricultural education and should be occurring amongst all students involved in the agricultural education program (Edwards, 2003; Ricketts & Rudd, 2004). Multiple studies have examined critical thinking skills in agricultural education environments and have determined these skills do occur (Burris & Garton, 2006; Cano, 1990; Rollins, 1990). Prior research suggests agricultural education is highly valued in its ability to enhance critical thinking skills. The National FFA Organization (2012) stated that Career Development Events (CDEs) help promote students ability to think clearly. Additionally, research shows students enrolled in agricultural education have higher critical thinking skills than students enrolled in science, math, and English (Cano & Martinez, 1991). However, further research needs to be conducted to study the relationship of FFA activities on members' critical thinking skills.

## Theoretical Framework

The theoretical framework for this study is based off of Beyer's (1987) theory of how best to teach critical thinking which includes six stages: 1) Introduction, 2) Guided practice, 3) Independent application, 4) Transfer and elaboration, 5) Guided practice, and 6) Autonomous use.

Beyer (1987) posited that, "Establishing and maintaining a structure that facilitates the teaching and learning of thinking is extremely important to improving student thinking" (p. 83). According to Tishman and Andrade (1996), students' disposition of critical thinking can be improved by instructional methods that promote critical thinking.

The three components of agricultural education, classroom/laboratory instruction, FFA, and Supervised Agricultural Experience (SAE), encompass the six stages of teaching critical thinking provided by Beyer (1987) (see Figure 1). The classroom/laboratory instruction provides an introduction to the curriculum, guided practice, and independent practice. SAEs and FFA activities also provide students with the opportunity to transfer the knowledge they learned in the classroom/laboratory instruction to a new setting with guided practice from their agricultural science teacher. Agricultural education students complete Beyer's (1987) six stages by being required to operate their own SAE project and utilizing decision making skills in various FFA activities in the autonomous use stage.

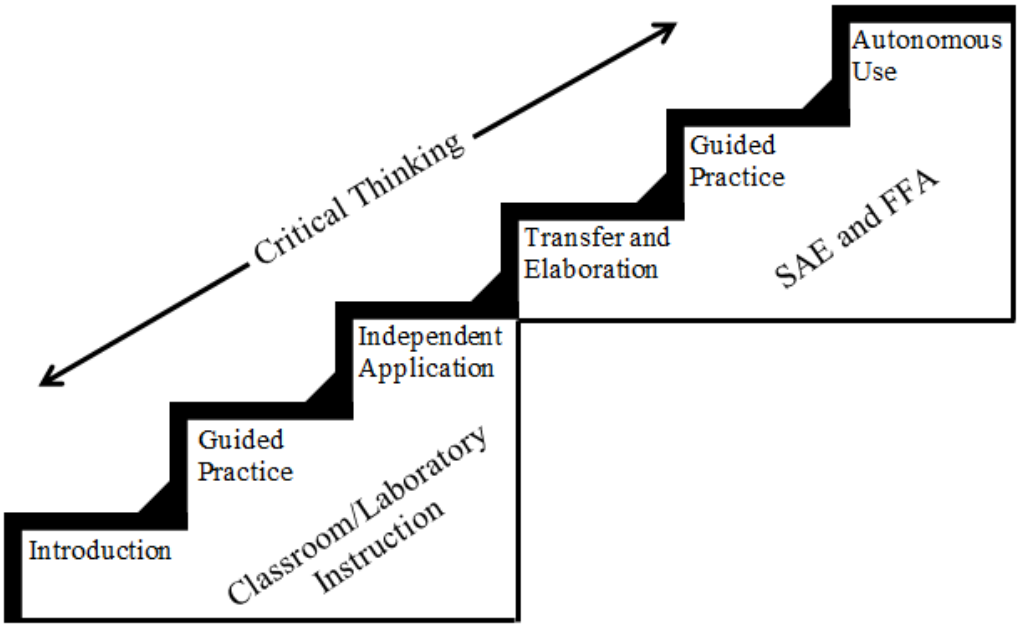


*Figure 1.* Critical Thinking in Agricultural Education. This figure implies that all three components of agricultural education can be a tool to implement Beyer's (1987) six stages of teaching critical thinking.

## Purpose and Objectives

The purpose of this study was to determine the influence of FFA activities on critical thinking skills of senior Texas FFA members in three-star FFA chapters. Three-star chapters were used to ensure students were provided ample opportunities to be active in various FFA activities. The objectives of this study were to:

1. Determine the critical thinking scores of senior Texas FFA members in Three-Star Chapters;
2. Determine which FFA activities are related to critical thinking scores;
3. Determine the relationship between the level of critical thinking skills of senior Texas FFA members within Three-Star Chapters and their years of experience participating in FFA activities; and
4. Determine if there is a relationship between the level of critical thinking skills and gender.

## Methods

This descriptive-correlational study examined the critical thinking levels of selected Texas FFA members. According to Fraenkel, Wallen, and Hyun (2012), a correlational design describes the relationship between two or more quantitative variables. This descriptive study examined the relationship that FFA activities have on critical thinking skills of Texas FFA members classified as seniors who have been on the chapter's roster for a minimum of two years in three-star chapters. A census of 150 senior FFA members from the participating chapters was used. The test scores of the sample group were used to correlate the critical thinking scores of senior members and the FFA activities in which they participated.

The generalizable population was senior FFA members in three-star chapters who have been on the chapter's roster for a minimum of two years who completed the Watson-Glaser Critical Thinking Appraisal® (WGCTA) Form A (Watson & Glaser, 2008a). A three-star chapter is one that receives a gold rating by their state and is then determined by the national chapter ranking system as one of the elite chapters in the nation (National FFA, 2014). Given the necessity of the participants for this study to have multiple experiences in FFA activities, we targeted three-star chapters in the state of Texas. A census was attempted of the senior FFA members who met these qualifications and that agreed to participate in the study. However, only sixty-five FFA members completed the instruments, which resulted in a 43% response rate.

The instrument was used to examine the Texas FFA members' level of critical thinking skills is the WGCTA Form A (Watson & Glaser, 2008a). Previous studies have deemed the WGCTA reliable by reporting a Cronbach's alpha internal consistency score ranging between .69 and .85, and the test-retest reliability was reported to be .73 (Watson & Glaser, 2008b). With this evidence, the WGCTA has been deemed reliable. External validity has been established by studies reporting that students enrolled in laboratory-centered classes (Sorenson, 1966) and learning through an experiential approach (Agne & Blick, 1972) score higher on the WGCTA than students enrolled in a lecture-based class. Therefore, results from various studies have deemed the instrument valid. The instrument uses five subtests to measure critical thinking skills. The five subtests are,

Test 1: Inference. Discriminating among degrees of truth or falsity of inferences drawn from given data.

Test 2. Recognition of Assumptions. Recognizing unstated assumptions or presuppositions in given statements or assertions.

Test 3. Deduction. Determining whether certain conclusions necessarily follow from information in given statements or premises.

Test 4. Interpretation. Weighing evidence and deciding if generalizations or conclusions based on the given data are warranted.

Test 5. Evaluation of Arguments. Distinguishing between arguments that are strong and relevant and those that are weak and irrelevant to a particular question at issue. (Watson & Glaser, 2008b, p. 2)

Within the five subtests, "exercises include problems, statements, arguments, and interpretations of data similar to those that are encountered on a daily basis at work, in the classroom, and in newspaper and magazine articles" (Watson & Glaser, 2008, p. 2). Since this study assessed senior FFA members, the Grade 12 scores from the WGCTA norm group were used to determine the FFA members' critical thinking percentile rankings (Watson & Glaser, 2008b). Watson and Glaser (2008b) tested the WGCTA using a norm group "based on a sample of school districts systematically selected with respect to geographic region, and the size and socioeconomic status of the communities served by the school districts" (p. 4). The WGCTA was used to produce quantitative data to obtain correlational scores between the senior FFA member's score and the FFA activity they were involved in.

An email was sent to the 20, three-star chapters in the state of Texas asking for their voluntary participation in the study. Eight out of the 20 schools replied and were willing to participate in the study. The eight participating schools had a total of 150 seniors and a census of senior FFA members in these programs was used. The agricultural science teachers were required to go through a training which was provided by Texas A&M University's Institutional Review Board. It provided instruction on the process of conducting research and how to ethically collect the data. Then the agricultural science teachers who agreed to participate were sent instructions to complete the research instruments, consent/assent forms, and the appropriate number of demographic surveys and WGCTA booklets and scantrons. The agricultural education teachers administered the demographics survey and the WGCTA paper-based appraisal. Using Dillman's (2000) tailored design method; three follow-up reminder emails were sent to the teachers in three week interval periods.

Once all of the instruments were returned, a coding number was assigned to each participant and printed on the demographic survey and their WGCTA scantrons. The coding number was used to correlate the students' FFA activities they participated in and their score on the WGCTA. Data analysis was conducted using the Statistical Package for Social Sciences for Windows version 22.0. Descriptive statistics were calculated and used in summarization of data to accomplish study objectives including; frequencies, percentages, means, and standard deviations. Additionally, a Pearson Product Moment correlation was calculated to determine if there was a relationship between demographics and the FFA members' score on the WGCTA.

## Results

Determining the level of critical thinking skills of Texas FFA members was the first objective of the study. To accomplish this objective, students were asked to complete the WGCTA to determine their level of critical thinking. Table 1 shows mean scores were calculated for the FFA members who completed the WGCTA. FFA members could receive a total of 80 points on the WGCTA. FFA members could score a total of 16 points on each of the five subtests. The mean score for all FFA members who completed the survey was 39.85, which is considerably lower than the WGCTA $12^{th}$ grade norm group at 48.5 (Watson & Glaser, 2008b). Using the percentile rankings presented in Table 1, with a mean score of 39.85, the FFA members who completed the WGCTA scored between the $20^{th}$ and the $25^{th}$ percentile of high school students in the $12^{th}$ grade (Watson & Glaser, 2008b). The FFA members performed best on the Evaluation of Arguments subtest with a mean of 9.02 and scored lowest on the Inference subtest with a mean of 5.35.

Table 1

*Descriptive Statistics for FFA members' scores on the Watson-Glaser Critical Thinking Appraisal (n=65)*

| WGCTA Total and Subtests | *M* | *SD* |
|---|---|---|
| WGCTA Total Score | 39.85 | 6.76 |
| Inference Subtest Score | 5.35 | 2.57 |
| Recognition of Assumptions Subtest Score | 8.52 | 2.66 |
| Deduction Subtest Score | 8.48 | 1.88 |
| Interpretation Subtest Score | 8.48 | 2.51 |
| Evaluation of Arguments Subtest Score | 9.02 | 2.16 |

*Note. WGCTA=Watson-Glaser Critical Thinking Appraisal*

The second objective of this study was to determine which FFA activities predict the highest level of critical thinking scores. This objective was met by comparing what the students answered on the demographic survey to their score on the WGCTA. Table 2 reports the frequencies and percentages of the FFA members' participation in the following FFA activities and at what level they completed. The results show FFA members were most involved in receiving an FFA degree ($f = 60$) and were least involved in speaking events ($f = 12$).

In order to determine the second objective, a regression analysis was used to correlate FFA members' scores on the WGCTA and the FFA activities in which they participated. The only FFA activity that is an indicator of FFA members' critical thinking ability is the State LDE activity ($t = 2.82$, $p < .05$). Unstandardized regression coefficients (B), intercept, and standardized regression coefficients (β) for each variable are presented in Table 3.

Table 2

*FFA Members' Participation in FFA Events (n=64)*

| FFA Activities | *f* | % |
|---|---|---|
| Officer Position | 23 | 35.9 |
| Chapter | 21 | 32.8 |
| District | 3 | 4.7 |
| Area | 0 | 0.0 |
| State | 0 | 0.0 |
| Leadership Development Events (LDE) | 37 | 57.8 |
| District | 30 | 46.9 |
| Area | 24 | 37.5 |
| State | 15 | 23.4 |
| National | 2 | 3.1 |
| Career Development Events (CDE) | 35 | 54.7 |
| Area | 28 | 43.8 |
| State | 22 | 34.4 |
| National | 0 | 0.0 |
| Conventions | 37 | 57.8 |
| District | 25 | 39.1 |
| Area | 31 | 48.4 |
| State | 31 | 48.4 |
| National | 17 | 26.6 |
| Leadership Camps/Workshops | 31 | 48.4 |
| Chapter | 25 | 39.1 |
| District | 25 | 39.1 |
| Area | 22 | 34.4 |
| State | 9 | 14.1 |
| National | 9 | 14.1 |
| FFA Degrees | 60 | 93.8 |
| Discovery | 10 | 15.6 |
| Greenhand | 35 | 54.7 |
| Chapter | 45 | 70.3 |
| Lone Star | 32 | 50.0 |
| Speaking Events | 12 | 18.8 |
| District | 8 | 12.5 |
| Area | 8 | 12.5 |
| State | 2 | 3.1 |
| National | 0 | 0.0 |

*Note. Lone Star Degree is the state degree in Texas. Students could have marked that they were active in multiple levels of the activities; therefore, the frequencies listed in the activity level may not match the total frequency for the activity.*

Table 3

*Regression Analysis of Watson-Glaser Critical Thinking Appraisal Scores vs. FFA Activities (n-64)*

| FFA Activities | *B* | *Std. Error* | Beta | *t* | *Sig.* |
|---|---|---|---|---|---|
| Officer Position | 3.66 | 5.30 | .26 | 0.69 | .50 |
| Chapter | -2.26 | 7.82 | -.16 | -0.29 | .78 |
| District | -5.64 | 4.99 | -.18 | -1.13 | .27 |
| LDE | 7.72 | 8.02 | .58 | 0.96 | .34 |
| District | -2.66 | 6.58 | -.20 | -0.40 | .69 |
| Area | -0.12 | 3.91 | -.01 | -0.03 | .98 |
| State | 9.26 | 3.29 | .59 | 2.82 | .01 |
| National | -1.17 | 7.18 | -.03 | -0.16 | .87 |
| CDE | 1.24 | 5.92 | .09 | 0.21 | .84 |
| Area | 2.62 | 5.47 | .20 | 0.48 | .64 |
| State | 0.30 | 2.90 | .02 | 0.10 | .92 |
| Conventions | 5.54 | 5.06 | .41 | 1.09 | .28 |
| District | -2.75 | 5.13 | -.20 | -0.54 | .60 |
| Area | -2.20 | 4.26 | -.17 | -0.52 | .61 |
| State | -1.69 | 4.75 | -.13 | -0.36 | .72 |
| National | -1.48 | 5.33 | -.10 | -0.28 | .78 |
| Leadership Camps/Workshops | -10.66 | 6.62 | -.80 | -1.61 | .12 |
| Chapter | -6.67 | 5.30 | -.49 | -1.26 | .22 |
| District | 9.16 | 5.54 | .68 | 1.65 | .11 |
| Area | 1.02 | 3.88 | .07 | 0.26 | .79 |
| State | -0.17 | 6.65 | -.01 | -0.03 | .98 |
| National | 1.88 | 6.00 | .10 | 0.31 | .76 |
| FFA Degrees | -1.36 | 4.41 | -.05 | -0.31 | .76 |
| Discovery | 5.85 | 3.80 | .32 | 1.54 | .13 |
| Greenhand | -1.24 | 3.10 | -.09 | -0.40 | .69 |
| Chapter | -0.13 | 3.23 | -.01 | -0.04 | .97 |
| Lone Star | -2.21 | 3.43 | -.17 | -0.65 | .52 |
| Speaking Events | -5.00 | 9.04 | -3.0 | -0.55 | .58 |
| District | -0.70 | 7.40 | -.04 | -0.10 | .93 |
| Area | 3.72 | 6.48 | .19 | 0.57 | .57 |
| State | 14.92 | 7.98 | .39 | 1.87 | .07 |

*Note. Lone Star Degree is the state degree in Texas. The following FFA activities are not represented in this table due to the lack of participation by the research participants: Area and State Officer Positions, National CDE, and National Speaking Events.*

The third objective was to explain the relationship between FFA members' years of experience in FFA and their critical thinking scores. To meet the third objective, the FFA members were asked how many years they were active in FFA. The FFA members' scores on the WGCTA were then correlated to how many years of experience they have in FFA. The purpose of this objective was to investigate whether or not critical thinking scores differed based on how many years the students were active in FFA.

To study the fourth objective, the students were asked if they were male or female on the demographic survey, and their answer was then correlated to their score on the WGCTA. As shown in Table 4, females' ($M$ = 42.17) average scores were higher on the WGCTA than males' ($M$ =

36.63) average score. However, these results are practically significant with the females scoring in the 30th percentile and the males scoring in the 10th percentile of the WGCTA norm group.

Table 4

*Differences in FFA Members' Critical Thinking Scores based on Gender*

| Gender | N | *M* | *SD* |
|---|---|---|---|
| Female | 36 | 42.17 | 6.98 |
| Male | 27 | 36.63 | 4.78 |

In order to outline the third and fourth objectives, a regression analysis was used to correlate FFA members' scores on the WGCTA and their demographics. Gender is an indicator of FFA members' critical thinking ability ($t = 2.58$, $p < .05$), whereas years of experience are not an indicator of critical thinking ability. Unstandardized regression coefficients (B), intercept, and standardized regression coefficients (β) for each variable are presented in Table 5.

Table 5

*Regression Analysis of Watson-Glaser Critical Thinking Appraisal Scores vs. Demographics (n-64)*

| Demographics | *B* | *Std. Error* | Beta | *t* | *Sig.* |
|---|---|---|---|---|---|
| Years of Experience | -0.78 | 1.37 | -.11 | -0.56 | .57 |
| Gender | 6.28 | 2.43 | .47 | 2.58 | .02 |

To further investigate the third and fourth objectives, a Pearson Product Moment correlation was calculated to determine if there was a relationship between demographics and the FFA members score on the WGCTA. This study used Davis (1971) as a guideline for interpreting the magnitude of correlational coefficients with .70 or higher being identified as a very strong correlation, .50 to .69 as a substantial correlation, .30 to .49 as a moderate correlation, .10 to .29 as a low correlation, and .01 to .09 as a negligible correlation. Therefore, Table 6 shows a moderate correlation between gender (r = .41) and scores on the WGCTA and a low correlation between FFA members' years of experience (r = .19) and scores on the WGCTA.

Table 6

*Correlation between FFA members' Watson-Glaser Critical Thinking Appraisal Scores and Demographics (n=63)*

| Demographics | WGCTA Scores (r) |
|---|---|
| Years of Experience | .19 |
| Gender | .41 |

## Conclusions

According to Edwards (2003), critical thinking should be occurring in the secondary-level agricultural education classrooms and laboratories. The results of this study indicate that critical thinking, as assessed using the WGCTA, is occurring at a low level with the mean score for all FFA members who completed the WGCTA of 39.85 out of a possible score of 80. These scores are approximately 10 points lower than their contemporaries who have taken the WGCTA. This places the senior FFA members in this study between the 20th and the 25th percentile of 12th grade high school students (Watson & Glaser, 2008b). These results indicate a need for agricultural education to improve critical thinking skills instruction in all aspects of the curriculum when comparing agricultural education students and FFA members to non-agricultural education students and FFA members using the WGCTA. This could be done by teachers referring to the model in the theoretical framework which suggests how the three agricultural education components can be used as a tool to implement Beyer's (1987) stages of teaching critical thinking.

Additional research has provided evidence that, using the WGCTA to assess critical thinking, students score high on the Interpretation subtest (Simon & Ward, 1974; Gadzella, Ginther, & Bryant, 1996) and lowest on the Evaluation of Arguments subtest (Simon & Ward, 1974; Loo & Thorpe, 1999). However, this study's results align with the findings in Loo and Thorpe's (1999) study that suggested the Evaluation of Arguments subtest was the highest scoring subtests and Interpretation is the lowest. The senior FFA members had the highest mean of 9.02, out of 16, on the Evaluation of Arguments subtest, and the lowest mean of 5.35 on the Inference subtest.

It can be concluded from the results of this study that senior FFA members in three-star chapters in Texas are most proficient at determining the strength of an argument and whether or not the argument is relevant to the question at issue. Because the senior FFA members who participated in this study scored lowest in the Inference subtest, a conclusion can be made that they have the most trouble differentiating between true and false statements which are presented in the inferences drawn from given data. Based on these findings using the WGCTA to assess critical thinking, Texas FFA should strive to enhance the tasks in FFA activities that could develop inference skills in FFA members. This could be done by implementing categories/classes in FFA activities that enhance students' ability to draw inferences from data given to them.

The results indicated the FFA members who participated in this study were most involved in receiving an FFA degree and were least involved in speaking events. However, the only FFA activity that was an indicator of critical thinking was the State Leadership Development Event (LDE). It can be concluded in this study the FFA members who participated in the State LDE Contest could have higher critical thinking skills than the FFA members who competed in any other FFA activity when critical thinking is assessed using the WGCTA. Therefore, Texas FFA should evaluate the skills needed to advance to the State LDE activity and try to implement those skills in other FFA activities. This could allow Texas FFA to find which section of the State LDE activity is indicating critical thinking and why members who compete in this activity have higher critical thinking scores.

Some research suggests gender does not have an effect on critical thinking scores, and there is not a relationship between the two (Facione, Sanchez, Facione, & Gainen, 1995; Friedel et al., 2008). The findings were practically significant with the females scoring in the 30th percentile and the males scoring in the 10th percentile of the norm group. The results of this study contradict the previous study by providing evidence that the females' average scores on the WGCTA were higher than males' average score. Therefore, the results from this study support the studies that suggested females tend to have higher levels of critical thinking (Rudd, Baker, & Hoover, 2000; Walsh, 1996; Wilson, 1989). A conclusion can be made from these results that the female FFA members in three-star chapters in Texas are more proficient at critical thinking than the male FFA members when using the WGCTA. This could mean that the females are able to draw inferences, recognize

assumptions, utilize deduction, interpret evidence, and evaluate arguments at a higher level than males (Watson & Glaser, 2008b).

The results of this study showed a high correlation between gender and critical thinking scores, but a low correlation between FFA members' years of experience and critical thinking scores. The high relationship between gender and critical thinking scores refers back to the finding in this study females scored higher on the WGCTA than males, and therefore have a higher level of critical thinking skills. The low relationship between FFA members' years of experience and critical thinking scores suggests the longevity of an FFA member's experience in FFA may not make a difference in their critical thinking scores. FFA experiences and the activities students participate in, do little to develop critical thinking skills in senior Texas FFA members of Three-Star Chapters.

## Recommendations

### Recommendations for Practice

Since FFA is only one component of the agricultural education curriculum, the other two components, Supervised Agricultural Experience and Classroom/Laboratory Instruction, can be used as a support system to enhance FFA members' critical thinking skills. It is important for teachers to incorporate active learning within their curriculum to make the course more enjoyable for both themselves and the students (Duron, Limbach, & Waugh, 2005). A result of active learning is that it can cause students to think critically (Duron et al., 2005). Additionally, teachers can effectively implement critical thinking in their curriculum by designing their instruction around Beyer's (1987) six stages of teaching critical thinking in the classroom.

The results of this study indicate a dire need for FFA and agricultural education to incorporate more critical thinking skill building elements into their activities. When implementing these elements into FFA contests and activities, they should think about the five subtests of the WGCTA: Inference, Recognition of Assumptions, Deduction, Interpretation, and Evaluation of Arguments (Watson & Glaser, 2008b). All of the WGCTA subtests are important elements to critical thinking. Therefore, both the National and Texas FFA should strive to implement activities to enhance students' ability to incorporate these five components of critical thinking.

Agricultural science teachers should take into consideration that FFA has the ability to support Beyer's (1987) highest three stages of teaching critical thinking: transfer and elaboration, guided practice, and autonomous use. FFA has the ability to support the transfer and elaboration stage by allowing teachers to provide students the opportunity to transfer their knowledge learned in the classroom/laboratory instruction to a new setting. This stage would occur during practice for various FFA activities. If done properly, agricultural science teachers can provide the guided practice stage by guiding students during the transfer of knowledge to a new setting. Then the students display the autonomous use stage through the opportunity to use their knowledge in operation on their own in a contest.

### Recommendations for Research

The results of this study provided insight to further research that could be conducted in the area of critical thinking in secondary agricultural education programs. One suggestion is to replicate this study on a larger scale to accumulate a larger general population. This would allow research to more accurately describe the critical thinking skills of Texas FFA members and which FFA activities are indicators of critical thinking.

Another recommendation for further research is to replicate the methods of this study, but to be more specific and find out which events at the state LDE activity are predictors of critical thinking. This would provide evidence of which events the students' active in and which one scores

highest on critical thinking assessments. Furthermore, CDEs could be broken down into each event to see if any of the activities are an indicator of critical thinking. This investigation could show if any of the CDEs are indicators of critical thinking, or if none of the CDEs enhance critical thinking.

A qualitative study should be conducted to interview teachers on why they believe the results of this study indicate that FFA activities, with the exception of state LDEs, are not indicators of critical thinking. Additionally, the agricultural science teachers should be asked how they believe FFA activities could be improved to help enhance FFA members' critical thinking skills. This could provide insight into the reason why these results suggest that most FFA activities are not an indicator of critical thinking and how to improve the FFA activities in which FFA members compete.

The results of this study indicate a need for future research to be conducted on how agricultural education can improve students' ability to think critically. This could be done by using a mixed-methods study to interview a panel of teachers, administrators, and teacher educators on how they believe critical thinking skills can be improved in students enrolled in agricultural education classes. Next, a survey should be made from the interview findings in order to determine how to improve critical thinking skills on a larger scale. Additionally, research should be conducted by testing students' abilities to think critically as well as asking the teacher what strategies they use in their agricultural education programs to help enhance critical thinking skill.

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