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The Relationship Between Critical Thinking Skills and 4-H Judging Activity Success Among Nebraska 4-H Program Participants

Susan J. Kowalski

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THE RELATIONSHIP BETWEEN CRITICAL THINKING SKILLS AND 4-H JUDGING ACTIVITY SUCCESS AMONG NEBRASKA 4-H PROGRAM PARTICIPANTS

by

Susan J. Kowalski

A THESIS

Presented to the Faculty of

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Under the Supervision of Professor Birdie H. Holder

Lincoln, Nebraska

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THE RELATIONSHIP BETWEEN CRITICAL THINKING SKILLS AND 4-H JUDGING ACTIVITY SUCCESS AMONG NEBRASKA 4-H PROGRAM PARTICIPANTS

Susan J. Kowalski, M.Ed.

University of Nebraska, 1991

Advisor: Birdie H. Holder

The purpose of this study was to determine the relationship of the critical thinking score as measured by Watson-Glaser Critical Thinking Appraisal score and subscores (Inferences, Recognizing Assumptions, Reasoning by Deduction, Drawing Conclusions and Evaluating Arguments), and mastery of judging activities between 2 groups (upper and lower quartiles) of participants in the 1990 Nebraska 4-H Senior Livestock Judging Activity.

The study was descriptive-correlational in nature and was designed to gather data concerning the strength of relationships between variables.

Data were collected to:

1) describe the sample according to gender, age, and mastery of the judging activity; and describe the respondents according to gender, age, and mastery of the judging activity by quartiles; WGCTA subscores and critical thinking ability (WGCTA) total score; and

2) measure the relationship of the respondents between mastery of the judging activity and critical thinking skills (WGCTA score) by quartiles.
The population for the study was participants in the 1990 Nebraska Senior 4-H Livestock Judging Activity. The participants were ranked and divided into equal quartiles. The upper and lower quartiles were selected as the sample. Each quartile consisted of 36 individuals.

Fifty-one (70.83%) sample members responded to the study. Most (56.86 %) were male, but in proportion to the sample population. There were nearly equal numbers of respondents in the upper quartile (50.98 %) and lower quartile (49.02 %). The average age of the respondents was 16.20 years of age.

The mean scores for the respondents as a group on the WGCTA subscales and the WGCTA overall were:

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Inference</td>
<td>7.86</td>
</tr>
<tr>
<td>Recognition of Assumptions</td>
<td>12.08</td>
</tr>
<tr>
<td>Deduction</td>
<td>10.49</td>
</tr>
<tr>
<td>Interpretation</td>
<td>11.53</td>
</tr>
<tr>
<td>Evaluation of Arguments</td>
<td>11.55</td>
</tr>
<tr>
<td>WGCTA Composite</td>
<td>53.69</td>
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The relational analysis indicated that there were no significant differences between upper and lower quartiles on their performance in the WGCTA subscales or the WGCTA overall. A negative low association (-.18) was found between the upper and lower quartiles for the WGCTA Inference subscale. A negative low association (-.10) was found between the upper and lower quartiles for the WGCTA Deduction subscale. Positive negligible associations (.02 to .08) were found for Evaluation of Argument and Recognition of Assumption subscales. Negative negligible associations (-.03 to -.09) were found for all other WGCTA subscales and the WGCTA overall between the upper and lower quartiles.
ACKNOWLEDGEMENTS

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And last but certainly not least, to Clint, for the love, patience, support, understanding, and encouragement I always felt even though you were miles away during this process. Thank you! Without your support, I never would have finished this project.
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CHAPTER I
INTRODUCTION

The Smith-Lever Act of 1914 created the Cooperative Extension System. In cooperation with the United States Department of Agriculture (USDA) and land-grant universities, Cooperative Extension carries out a mission of teaching selected programs to the people of the United States. One of the selected programs is Cooperative Extension’s non-formal youth development program which involves parents, volunteers and university faculty who organize and conduct educational experiences and activities for young people ages 9-19. These youth education programs are known as 4-H.

Its mission is to help youth and volunteer staff acquire knowledge, develop life skills and strengthen values that enable them to become increasingly self-directing, productive, contributing citizens. (Nebraska 4-H in Review, 1990)

Life skills are taught through different 4-H projects, activities and events. Nebraska has identified seven life skills as goals from participation in the 4-H program. They are:

1. Understanding Self  
2. Relating With Others  
3. Communication  
4. Problem Solving and Decision Making  
5. Acquiring, Analyzing and Using Information  
6. Managing Resources  
7. Working With Others in Groups  
(Gobeli, 1990)

Life skills are more than learning technical skills such as cooking, woodworking or livestock production. They reflect the critical social, thinking, emotional and psychomotor skills that 4-H members must learn to function as
adults in society and accept community responsibilities.

Today the 4-H program across the United States has evolved to meet the needs of a rapidly changing society. Programming for youth audiences has been directed toward critical, contemporary issues. As 4-H continues to build life skills in its participants, it also is directing programming efforts toward youth at greater risk to personal and social dysfunction.

As reported by Frymier and Gansneder (1989), "children are at risk if they are likely to fail--either in school or in life." According to Elias and Tobias (1990), when many "at risk" youth finally arrive at psychiatric clinics, social service treatment facilities or mental health centers, care and treatment providers usually discover that the youth lack decision-making or problem solving skills. Bogenschneider (1990), in a Wisconsin study, states that well developed problem solving skills serve to protect children who are at risk. Werner and Smith (1982) as reported by (Bogenschneider, 1990), said that even though subjects in the study

... were not intellectually gifted, they did possess well-developed problem solving skills that they put to good use ... . They seemed to be able to control their impulses and concentrate on their schoolwork even when their home lives were disordered and chaotic.

Sound decision making skills allow people to manage their daily lives throughout many situations.

A 1984 study conducted by Collins found that adolescent Nebraska 4-H program participants gained decision making skills through participation in the 4-H program. Learning a life skill such as decision making or problem solving
requires training and practice according to Presseisen (1987) and Farrey (1985).

The 4-H program in many states has designed curricula that teach decision making and problem solving skills. Judging activities is one area of instruction that allows participants to practice these decision making skills.

According to Gersick, Grady and Snow (1988) decision making is the ability to identify problems, generate alternatives, consider consequences and risks of possible alternatives. Once individuals have learned the basic decision making steps and put them into practice over a long period of time, the decision making skills are broadened and individuals use them routinely, the decision making skills become a part of their normal thought processes that individuals use everyday (Elias and Tobias, 1990).

Thought processes and cognition are keys to understanding, learning and utilizing decision making steps. Critical thinking skills are used by people when they are solving problems and making decisions according to Buehner and Lucas (1989). Elias and Tobias (1990) say that as decision making is taught, youth quickly begin to see the usefulness of thinking. Without critical thinking ability, youth and adults alike run the risk of reaching incorrect solutions. Thinking skills are an essential step in problem solving and decision making.

Problem Statement

The purpose of the study was to determine the relationship of the critical
thinking score as measured by Watson-Glaser Critical Thinking Appraisal score and subscores (Inferences, Recognizing Assumptions, Reasoning by Deduction, Drawing Conclusions and Evaluating Arguments), and mastery of judging activities between 2 groups (upper and lower quartiles) of participants in the 1990 Nebraska 4-H Senior Livestock Judging Activity.

Objectives

To describe the population of Nebraska 4-H Senior Livestock Judging participants on the following characteristics:

a. Gender
b. Age
c. Mastery of the judging activity
d. WGCTA Subscores
   - Inferences
   - Recognition of Assumptions
   - Deduction
   - Interpretation
   - Evaluation of Arguments
e. Critical Thinking Score (WGCTA)

2. To determine if there was a high level of relationship between mastery of judging activity and level of critical thinking skills between participants in the upper quartile and lower quartile the 1990 Nebraska Senior Livestock judging activity.

Significance of Study

A goal of the 4-H education program is to assist youth and adults gain life skills to help them function as productive citizen’s in today’s society. One of these life skills is decision making. Buehner and Lucas (1989), have found that critical thinking skills are used by people when they are solving problems and making decisions. Good critical thinking and decision making skills enable
people to manage their daily lives throughout many situations.

By determining the relationship between the critical thinking score as measured by the Watson-Glaser Critical Thinking Appraisal (WGCTA) Composite score and subscores, and mastery of judging activities between two groups of the 1990 Nebraska 4-H Senior Livestock Judging Activity, the researcher hoped to determine a significant difference in which, if any, of the five subscores and score of the WGCTA are higher in the upper quartile as compared to the lower quartile of the sample.

Extension agents will be able to use knowledge gained in this study to assess the importance of critical thinking skills as they relate to judging activities. This study will also enable Extension agents to design educational programs to enhance critical thinking of 4-H program participants. In addition, Extension agents will have the ability to design educational programs to train adult volunteers in knowing what is important in assisting 4-H program participants in judging activities.

**Definition of Terms**

**Adolescence**

The state or process of maturing; begins at the onset of puberty to maturity, ending at the age when full civil rights are attained.

**Adult 4-H Volunteer**

Citizen who works with youth in the 4-H program on the local level to provide leadership to 4-H members as they work in projects or activities.
Critical Thinking Skills

Using basic thinking processes to analyze arguments and generate insight into particular meanings and interpretations; (Presseisen, 1987).

Decision Making Skills

The ability to identify problems, generate alternatives, consider consequences and risks of possible alternatives.

Extension Agent

Non-formal educator, employed by Cooperative Extension, located in a county or multi-county area, who has direct clientele contact. The agent works in one or more of the following discipline areas: agriculture, home economics 4-H and youth, community resource development.

Four-H

The youth development education program of Cooperative Extension. Participants are 9-18 years old and learn technical and life skills through 4-H projects and activities.

Judging

The ability of an individual to form an opinion or make a decision based on current knowledge, careful consideration of evidence and the testing of alternate solutions.

Judging Activity

An organized event in which individuals practice and/or test their decision making skills in different subject areas.
Life Skills

Equip a person to perceive and respond to significant life events; are competencies which enable a person to live in an interdependent society; enable a person to be self-directing and productive and to lead a satisfying life, and to contribute to society; give a person the ability to function effectively in a changing world (4-H in Century III, 1976).

Livestock Judging

An organized event in which individuals practice and/or test their decision making skills on selection of animals using research based standards for beef, sheep, and swine species.

Mastery of Judging Activities

A high level of competence exhibited by an individual or individuals in their ability to form an opinion or make a decision based on current knowledge, careful consideration of evidence and testing of alternate solutions; in organized events that test the decision making skills of these individuals in different subject areas.

Protective factors

Often merely the opposite of risk factors; one major difference, however, is that risk factors lead directly to disorder while protective factors operate only when a risk is present (Rutter, 1987).
Technical Skills in 4-H

Technique or systematic procedure by which a task is accomplished; learned through 4-H experience.

Youth At Risk

"At-riskness" is a function of what bad things happen to a child, how severe they are, how often they happen, and what else happens in the child’s immediate environment. Youth become "at risk" from three primary conditions: lack of closeness and trust in dealing with adults; lack of perception of meaning in their lives; and lack of confidence in facing life (Glenn, 1988).

Watson-Glaser Critical Thinking Appraisal (WGCTA)

Measures five aspects of the ability to think critically; drawing sound inferences, recognizing assumptions, reasoning by deduction, drawing conclusions and evaluating arguments.

Limitations

For the purposes of this study, the characteristics of a 4-H judging activity were best represented in the Nebraska 4-H Senior Livestock judging activity.

For the purposes of this study, the Judging Activity examined was the 1990 Nebraska 4-H Senior Livestock Judging Contest.

Due to the nature of the sample population selected and the variation that exists between 4-H judging activities, caution must be extended in
generalizing the findings to all 4-H judging programs.

Assumptions and Delimitations

It was assumed that quartile performance in the 1990 activity reflected mastery of the judging activity.

It was assumed that the Watson-Glaser Critical Thinking Appraisal validly and reliably measured the critical thinking abilities of individuals who completed the appraisal.

It was assumed the Watson-Glaser Critical Thinking Appraisal was administered to subjects following instructions in the test manual.

The study was limited to a population of Nebraska 4-H program participants.
CHAPTER II

REVIEW OF LITERATURE

In order to determine the relationship of high critical thinking skills and mastery of judging activities among Nebraska 4-H program participants, this literature review focused on the following:

1. Decision making and the steps necessary to perform this task.
2. Cognition and metacognition as they relate to thinking skills and the relationship of knowledge to the effectiveness of decisions.
3. The critical thinking skills necessary in effective decision making.
4. Evidence of decision making skills gained through 4-H program participation.
5. The justification of using the Watson-Glaser Critical Thinking Appraisal as an indicator of decision making ability.

Decision Making

Individuals make decisions every day of their lives. According to Gersick, Grady and Snow (1988) decision making is the ability to identify problems, generate alternatives, consider consequences and risks of possible alternatives. Once individuals have learned the basic decision making steps and put them into practice over a long period of time, the decision making skills are broadened and individuals use them routinely, the decision making skills become a part of their normal thought processes that individuals use everyday (Elias and Tobias 1990).

According to Elias and Tobias (1990), decision making skills include:
a) a core set of thinking skills essential for successful
decision making, such as the ability to understand signs of one's own
and others' feelings, the ability to decide on one's goals, and the ability
to think in terms of long-and short-term consequences both for oneself
and others; b) a set of "readiness" or learning-to-learn skills, which
include the main areas of increasing self-control and building social skills
for group participation and social awareness; and c) explicit guidance in
applying social decision-making skills in personal situations that occur
throughout each day.

The skills listed by Elias and Tobias are quite similar to the goals of the
4-H program in building life skills in youth to help them become self-directing,
productive contributing members of society. The researchers state that

... while we cannot prepare youth for each and every decision and all
the situations they might encounter, we have the responsibility as adults
and educators to help prepare the youth for coping with the pressures,
demands and responsibilities they will face on a daily basis.

Cognition and Metacognition

Thought processes and cognition are keys to understanding, learning
and utilizing decision-making steps. Bartlett (1958) as reported in Nickerson,
Perkins and Smith (1985) stated that thinking is a skilled behavior. It allows us
to draw parallels with other complex skills and speculate that the amount we
know about the acquisition of motor skills is applicable to the cognitive domain.
For example, thinking skills can be taught, practiced and learned by individuals
just as well as physical skills.

McPherson and Thomas, in a 1989 study of young male tennis players
went a step beyond. They studied expert and novice tennis players (10-11 and
12-13 years old). The players were compared on control, decision and
execution. Their findings showed that the expert players exhibited more alternative action concepts and focused on higher level concepts of the game. McPherson and Thomas concluded that the expert players greater decision-making ability was related to their higher knowledge structure.

The role that knowledge plays in cognition and thinking skills is important. Skillful thinking may be the ability to apply knowledge effectively according to Nickerson, Perkins and Smith (1985). They say there is a difference between having a skill and knowing when to apply it; between improving one's performance on some particular task and realizing that one has done so.

Such differences have led to metacognition, or more specifically, metacognitive knowledge. This is related to how humans acquire thinking processes and are enabled to use those processes; or a conscious knowledge about our memory and thought processes.

Presseisen (1987) believes that metacognition is the ability to be conscious of one's own actions and their effects. The ability of an individual to do something efficiently and productively, and not simply do more of the same is the real strength of metacognition.

Sternberg (1979) as reported by Presseisen (1987), notes that many tasks can be performed without conscious thought after the learner has built up and practiced specific decision making skills over a long period of time. Elias and Tobias reported similar findings in 1990.
It is important that we see a sequence of ability formation with metacognition as with cognition. As adolescents grow in their cognitive skills, they should also continue to grow in their metacognitive skills. Those skills that help them learn to develop strategies that in turn help them work through various decision making steps.

Only recently have metacognitive skills been identified. These include planning, predicting, checking, reality testing and monitoring and control of one's own deliberate attempts to perform intellectually demanding tasks according to Nickerson, Perkins and Smith (1985). These skills directly parallel the skills that are the definition of decision making as it pertains to this study.

While some researchers do imply that problem-solving and decision-making are basically the same skill only with different names, Presseisen (1987), discusses them as two separate complex thinking skills. In effective problem-solving, the individual must turn tacit knowledge into explicit information. In decision-making, individuals make reasonable choices among several identified alternatives, which are based on the manner in which the individual makes judgements that are consistent with their own values. Often these decisions can be tentative and are based on incomplete evidence.

**Critical Thinking**

Presseisen (1987) considers critical thinking skills as a complex skill. Critical thinking is a certain approach to rational thought processing, that places emphasis on understanding meanings and relationships between language and
logic. The thinker must wait for evidence and carefully analyze arguments in this process. Critical thinking according to Presseisen (1987) encourages people to challenge assumptions to clarify situations and then use their logical and psychological abilities to determine judgements.

Heiman and Slomianko (1985) offer the following definition of critical thinking. They contend that critical thinking is:

... engaging in internal dialogue, you demonstrate important skills, raise questions, break up complex ideas into components, draw on prior knowledge, and translate complicated ideas into examples. (Heiman and Slomianko, 1985)

In decision-making, individuals make reasonable choices among identified alternatives. The individual must carefully analyze each alternative and consider the consequences of each alternative. Simply stated, once this has been done, the individual is able to reach a decision.

4-H Judging Activities

Judging activities is just one of the many events that teach decision making skills to 4-H program participants (Collins, 1984). Although no printed definition of judging was found, the following description is proposed for the purpose of this study: the ability of an individual to form an opinion or make a decision based on current knowledge, careful consideration of evidence and the testing of alternate solutions.

In Nebraska, the 4-H program has implemented judging activities to test the decision making skills of adolescent 4-H members. Collins (1984),
concluded that decision making skills were learned through participation in 4-H judging activities. For the purposes of this study, the focus will be on the 1990 Nebraska 4-H Senior Livestock Judging activity.

Watson-Glaser Critical Thinking Appraisal

The Watson-Glaser Critical Thinking Appraisal (WGCTA) measures five aspects of the ability to think critically; drawing sound inferences, recognizing assumptions, reasoning by deduction, drawing conclusions and evaluating arguments. WGCTA measures what was defined as the steps in decision making which are as follows: an ability to identify problems, generate alternatives, and consider consequences and risks of possible alternatives.

Reviews are favorable for use of WGCTA to measure critical thinking ability. Exercises in the test include problem 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 according to Berger (1985).

Norms for the test for high school students are based on a sample from 24 high school districts in 17 states, with emphasis on geographic region, size and socioeconomic status of communities, gender and cultural diversity group representation.

Berger (1985), cautioned researchers utilizing the WGCTA, against using the scores to evaluate sub-skill attainment by individuals because part-scores are based on a relatively small number of items and lack sufficient reliability for
this purpose. However, he continues by stating that part-scores or subscores may be utilized to analyze and determine the types of Critical Thinking training most needed by groups who take the appraisal.

Summary

According to studies cited by Tobias and Elias (1990) and Buehner and Lucas (1989), and evidence cited in the review of literature, it was concluded that critical thinking is important in the decision making process. Findings indicate that 4-H program participants gain decision making skills through their involvement in the 4-H program. In Nebraska, judging activities are designed to test those decision making skills.

The procedure for this study was to measure the critical thinking skills of the 1990 Nebraska 4-H Senior Livestock judging activity participants using the WGCTA. The lack of correlational literature linking 4-H judging activities and decision making skills was the reason for conducting this study.
CHAPTER III
METHODOLOGY

The purpose of this study was to determine the relationship of the critical thinking score as measured by Watson-Glaser Critical Thinking Appraisal score and subscores (Inferences, Recognizing Assumptions, Reasoning by Deduction, Drawing Conclusions and Evaluating Arguments), and mastery of judging activities between 2 groups (upper and lower quartiles) of participants in the 1990 Nebraska 4-H Senior Livestock Judging Activity.

The study was descriptive-correlational in nature and was designed to gather data concerning the strength of relationships between variables. Like a "naturally occurring experiment," (Kerlinger, 1973) the independent variables (age, gender, mastery of judging activities) previously occurred and were not controlled by the researcher.

The WGCTA critical thinking score and subscale scores were the dependent variables. The target population of the study to which results were generalized were participants in the 1990 Nebraska 4-H Senior Livestock Judging activity.

Hypotheses

The hypotheses under investigation included:

\(H_0\) one: There is no significant difference between the upper quartile and lower quartile of the sample, in their WGCTA Inferences subscore.
$H_0$ two: There is no significant difference between the upper quartile and lower quartile of the sample in their WGCTA Recognition of Assumptions subscore.

$H_0$ three: There is no significant difference between the upper quartile and lower quartile of the sample, in their WGCTA Deduction subscore.

$H_0$ four: There is no significant difference between the upper quartile and lower quartile of the sample, in their WGCTA Interpretation subscore.

$H_0$ five: There is no significant difference between the upper quartile and lower quartile of the sample, in their WGCTA Evaluation of Arguments subscore.

$H_0$ six: There is no significant difference between the upper quartile and lower quartile of the sample, in the WGCTA Composite score.

$H_0$ seven: There is no association between the upper quartile and lower quartile of the sample, in their WGCTA Inferences subscore.

$H_0$ eight: There is no association between the upper quartile and lower quartile of the sample in their WGCTA Recognition of Assumptions subscore.

$H_0$ nine: There is no association between the upper quartile and lower quartile of the sample, in their WGCTA Deductions subscore.

$H_0$ ten: There is no association between the upper quartile and lower quartile of the sample, in their WGCTA Interpretations subscore.
\(H_0\) eleven: There is no association between the upper quartile and lower quartile of the sample, in their WGCTA Evaluation of Arguments subscore.

\(H_0\) twelve: There is no association between the upper quartile and lower quartile of the sample, in their WGCTA Composite score.

**Population**

The 1990 Nebraska 4-H Senior Livestock Judging activity consisted of 142 participants. Table 1 describes the participants by age, Table 2 summarizes the population by gender and Table 3 illustrates the participants mastery of the judging activity by ribbon group placing.

Table 1

1990 Nebraska 4-H Senior Livestock Judging activity participants by age.

<table>
<thead>
<tr>
<th>Age (years)*</th>
<th># of Participants</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>58</td>
<td>40.84</td>
</tr>
<tr>
<td>16</td>
<td>43</td>
<td>30.28</td>
</tr>
<tr>
<td>17</td>
<td>23</td>
<td>16.20</td>
</tr>
<tr>
<td>18</td>
<td>12</td>
<td>8.45</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>4.23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>142</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

* as of January 1, 1991
Table 2
1990 Nebraska 4-H Senior Livestock Judging activity participants by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th># of Participants</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>86</td>
<td>60.56</td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>39.44</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 3
1990 Nebraska 4-H Senior Livestock Judging activity participants by ribbon group placing

<table>
<thead>
<tr>
<th>Ribbon Group*</th>
<th># of Participants</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple</td>
<td>30</td>
<td>21.13</td>
</tr>
<tr>
<td>Blue</td>
<td>46</td>
<td>32.39</td>
</tr>
<tr>
<td>Red</td>
<td>44</td>
<td>30.99</td>
</tr>
<tr>
<td>White</td>
<td>22</td>
<td>15.49</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* Ribbon group placings and equivalent academic ranking are as follows:
Purple - Superior rating Academic grade of A; Blue - Excellent rating Academic grade of B; Red - Good rating Academic grade of C; White - Needs improvement to Academic grade of D.

Permission

Use of the 1990 Nebraska 4-H Senior Livestock Judging activity data on age, gender and ribbon placing was obtained from Dr. Gary W. Gerhard, Nebraska 4-H Judging activity coordinator. Dr. Gerhard granted permission to view 1990 SF 16 forms for names, addresses, and age data on the population.
Instrumentation

After a thorough review of instruments, the Watson-Glaser Critical Thinking Appraisal (WGCTA) was selected. Originally appearing in 1942, WGCTA was last updated in 1980. WGCTA measures five aspects of the ability to think critically. Contents of the exercises on the test reflected material that was encountered in daily life. The test was designed for individuals in grades 9-12. Approximately 45 minutes was needed to complete the test. Each subscale contained 16 test items for an overall total of 80 items.

Exercises in the Drawing Sound Inferences section began with a statement that the examinee was to be regarded as true. This statement was followed by a series of inferences. The examinee decided whether the inferences could be supported or the degree to which each inference could be supported.

Exercises in the Recognizing Assumptions section included a series of statements which were followed by proposed assumptions. The examinee decided whether the assumptions were taken for granted in the statement.

In the Reasoning by Deduction section, the examinee decided whether a series of conclusions necessarily follow from statements that were to be regarded as true.

Exercises in the Drawing Conclusions section included a series of short paragraphs that were followed by a set of possible conclusions. The examinee
decides whether the conclusions logically follow from the information given in
the paragraph.

In the Evaluating Arguments section, the examinee decides whether each
of a series of arguments provided strong or weak support for a particular
position.

WGCTA had split-half reliability coefficients that range from .69 to .85 for
the five subtest areas. The stability of WGCTA has been assessed over time by
a test-retest at a 3-month interval which has a correlation of .73. WGCTA has
two test forms, A and B. The correlation of the two forms is .75 with nearly
identical means and standard deviations for the two test forms.

Evidence of WGCTA's validity was drawn from studies using the revised
Forms A and B. The extent to which WGCTA measures a sample of the
specified objectives of instructional programs was an indication of its content
validity.

Users of WGCTA were cautioned because the test measures critical
thinking through reading. Caution is also extended due to the fact that scores
are based on test items the scope and content of which can be considered
narrow in some cases.

Data Collection Procedures

The independent variable gender was classified as nominal. The
independent variable age was classified as ordinal data. Ratio data was
collected on the independent variable of judging mastery as well as the dependent variables score of critical thinking ability (WGCTA) and WGCTA subscale scores.

The following time-table was followed for data collection:

1. Notification of Extension agents in the counties where sample subjects were enrolled in the 4-H program was completed by letter by June 26, 1991; (see Appendix B and C).

2. Letter to subjects and parents informing them of the upcoming study and issuing an invitation for participation was mailed June 26, 1991. (See Appendix D).

3. Cover letter, WGCTA test booklet, answer sheet, instruction sheet, and postage paid return envelope was mailed to subjects July 2, 1991. (See Appendix E).

4. Personal phone contact to subjects inquiring of questions they may have about the study and to personally thank them for participation to improve return rate were made July 8-9, July 12, and July 18, 1991.

5. Reminder letter to subjects and parents was mailed July 18, 1991. (See Appendix F).

**Research Design and Analysis**

The design of the study was ex post facto. WGCTA scoring and subscale scoring, and all other data were analyzed with the STATVIEW 512+ computer program for the Apple Macintosh SE.

Descriptive statistics were used to present the sample of the participants in regards to their mastery of the judging activity as well as their measures of critical thinking score and subscores, the dependent variables. T-tests were calculated between mean scores on critical thinking between the upper and
lower quartiles.

Next, Spearman-rank Correlation Coefficients were calculated between the dependent variables and the independent variable (performance in the judging activity). Inferences to the population from the accepting sample were made at an alpha level of .05. Terms used to describe measures of association between variables are outlined in Figure 1.

Figure 1
Descriptive Terms Used to Describe Measures of Association

<table>
<thead>
<tr>
<th>Correlation Coefficient</th>
<th>Descriptive Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>.70 or higher</td>
<td>Very Strong Association</td>
</tr>
<tr>
<td>.50 to .69</td>
<td>Substantial Association</td>
</tr>
<tr>
<td>.30 to .49</td>
<td>Moderate Association</td>
</tr>
<tr>
<td>.10 to .29</td>
<td>Low Association</td>
</tr>
<tr>
<td>.01 to .09</td>
<td>Negligible Association</td>
</tr>
</tbody>
</table>

Source: Davis, 1971
CHAPTER IV
PRESENTATION AND ANALYSIS OF THE DATA

Data presented in this chapter were collected to:

1) describe the sample according to gender, age, and mastery of the judging activity by quartiles; and describe the respondents according to gender, age, and mastery of the judging activity by quartiles; WGCTA subscores and critical thinking ability (WGCTA) total score; and

2) measure the relationship of the respondents between mastery of the judging activity and critical thinking skills (WGCTA score) by quartiles.

Definition of Sample

The 142 1990 Nebraska 4-H Senior Livestock Judging Activity participants were ranked from top score to bottom score and divided into quartiles. The upper and lower quartiles were selected as the sample population. Thirty-six participants were identified in each of the upper and lower quartiles for a sample population of 72 participants. Tables 4 - 6 describe the sample (in upper and lower quartiles) by gender, age and ribbon group placing (mastery of judging activity). Persons in the sample were invited to participate in the study and received the WGCTA and instrument instructions through the mail. Table 4 indicates that most of the sample (62.50 %) were males and the
remaining sample were females.

Table 4

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample participants by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total #</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>24</td>
<td>21</td>
<td>45</td>
<td>62.50</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>15</td>
<td>27</td>
<td>37.50</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>36</td>
<td>72</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 5 shows that most (40.28 %) of the sample were 15 years of age (the youngest age possible) and the remaining numbers of the sample decreased in age as the sample grew older. The oldest possible age of the sample was 19 years.

Table 5

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample participants by age

<table>
<thead>
<tr>
<th>Age *</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total #</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10</td>
<td>19</td>
<td>29</td>
<td>40.28</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>6</td>
<td>18</td>
<td>25.00</td>
</tr>
<tr>
<td>17</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>19.44</td>
</tr>
<tr>
<td>18</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>9.72</td>
</tr>
<tr>
<td>19</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>5.56</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>36</td>
<td>72</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* as of January 1, 1991
Table 6 indicates that most (41.67 %) of the sample were members of the purple ribbon group placing. The white ribbon group was the second most (31.56%) prevalent division in the sample. Blue and red ribbon placing group members comprised the remaining portion of the sample.

Table 6

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample participants by ribbon group placing

<table>
<thead>
<tr>
<th>Ribbon Group*</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total #</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>41.67</td>
</tr>
<tr>
<td>Blue</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>8.33</td>
</tr>
<tr>
<td>Red</td>
<td>0</td>
<td>14</td>
<td>14</td>
<td>19.44</td>
</tr>
<tr>
<td>White</td>
<td>0</td>
<td>22</td>
<td>22</td>
<td>31.56</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>36</td>
<td>72</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* Ribbon group placings and equivalent academic ranking are as follows: Purple - Superior rating Academic grade of A; Blue - Excellent rating Academic grade of B; Red - Good rating Academic grade of C; White - Needs improvement to Academic grade of D.

Tables 7-9 describe the sample respondents according to gender, age and mastery of the judging activity by upper and lower quartiles. Table 7 indicates that most (56.86 %) of the respondents were males, but in proportion to the sample, and the remaining respondents were females.
Table 7

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample respondents by gender (n=51)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
<td>12</td>
<td>29</td>
<td>56.86</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>13</td>
<td>22</td>
<td>43.14</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>25</td>
<td>51</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 8 reflects that most (39.58%) of the respondents were 15 years old, and that there were nearly identical percentages of respondents who were 16 years old (22.92%) and 17 years old (20.83%). The remaining numbers of respondents decreased as the respondents grew older.

Table 8

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample respondents by age (n=51)

<table>
<thead>
<tr>
<th>Age *</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10</td>
<td>9</td>
<td>19</td>
<td>37.25</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
<td>6</td>
<td>13</td>
<td>25.49</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>6</td>
<td>11</td>
<td>21.57</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>11.77</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3.92</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>25</td>
<td>51</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* as of January 1, 1991
Table 9 shows that most respondents (45.10 %) were members of the purple ribbon placing group. Respondents who were members of the white ribbon placing group were the second most (29.42 %) prevalent.

Table 9

1990 Nebraska 4-H Senior Livestock Judging activity upper and lower quartile sample respondents by ribbon group placing (n=51)

<table>
<thead>
<tr>
<th>Ribbon Group*</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
<th>Total #</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple</td>
<td>23</td>
<td>0</td>
<td>23</td>
<td>45.10</td>
</tr>
<tr>
<td>Blue</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>5.88</td>
</tr>
<tr>
<td>Red</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>19.61</td>
</tr>
<tr>
<td>White</td>
<td>0</td>
<td>15</td>
<td>15</td>
<td>29.42</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>25</td>
<td>51</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* Ribbon group placings and equivalent academic ranking are as follows: Purple - Superior rating Academic grade of A; Blue - Excellent rating Academic grade of B; Red - Good rating Academic grade of C; White - Needs improvement to Academic grade of D.

Tables 10 - 15 describe the mean score, standard deviation, minimum and maximum score and range of scores of the WGCTA subscale (Inferences, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments) scores and composite score, for quartiles and the respondent group overall.
Table 10

Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Inference Subscale Scores by Quartile
(n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>8.27</td>
<td>2.22</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Lower</td>
<td>7.44</td>
<td>2.14</td>
<td>2</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>All</td>
<td>7.86</td>
<td>2.20</td>
<td>2</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 11

Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Recognition of Assumptions Subscale Scores by Quartile
(n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>11.89</td>
<td>2.39</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Lower</td>
<td>12.28</td>
<td>2.30</td>
<td>7</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>All</td>
<td>12.08</td>
<td>2.35</td>
<td>5</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 12

Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Deduction Subscale Scores by Quartile
(n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>10.69</td>
<td>2.33</td>
<td>7</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Lower</td>
<td>10.28</td>
<td>1.99</td>
<td>6</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>All</td>
<td>10.49</td>
<td>2.16</td>
<td>6</td>
<td>15</td>
<td>9</td>
</tr>
</tbody>
</table>
Table 13
Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Interpretation Subscale Scores by Quartile (n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>11.50</td>
<td>2.94</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Lower</td>
<td>11.56</td>
<td>2.31</td>
<td>7</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>All</td>
<td>11.53</td>
<td>2.63</td>
<td>5</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 14
Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Evaluation of Argument Subscale Scores by Quartile (n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>11.55</td>
<td>2.72</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Lower</td>
<td>11.60</td>
<td>3.06</td>
<td>3</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>All</td>
<td>11.55</td>
<td>2.86</td>
<td>3</td>
<td>16</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 15
Mean, Standard Deviation, Minimum, Maximum and Range of WGCTA Composite Scores by Quartile (n=51)

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>54.19</td>
<td>8.95</td>
<td>41</td>
<td>72</td>
<td>31</td>
</tr>
<tr>
<td>Lower</td>
<td>53.16</td>
<td>8.01</td>
<td>38</td>
<td>69</td>
<td>31</td>
</tr>
<tr>
<td>All</td>
<td>53.69</td>
<td>8.44</td>
<td>38</td>
<td>72</td>
<td>34</td>
</tr>
</tbody>
</table>
Table 16 indicates t-tests (pair t-value and probability two-tailed test) for upper and lower quartiles for all WGCTA subscales and WGCTA composite score, at .05 alpha level.

Table 16

T-Tests for upper and lower quartiles of WGCTA subscales and WGCTA composite scores for sample respondents (n=51)

<table>
<thead>
<tr>
<th></th>
<th>Paired t value</th>
<th>Probability(2-tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Inference</td>
<td>1.07</td>
<td>.29</td>
</tr>
<tr>
<td>Lower Inference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Recognition of Assumption</td>
<td>.64</td>
<td>.53</td>
</tr>
<tr>
<td>Lower Recognition of Assumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Deduction</td>
<td>.45</td>
<td>.64</td>
</tr>
<tr>
<td>Lower Deduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Interpretation</td>
<td>.19</td>
<td>.85</td>
</tr>
<tr>
<td>Lower Interpretation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Evaluation of Argument</td>
<td>.21</td>
<td>.83</td>
</tr>
<tr>
<td>Lower Evaluation of Argument</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper WGCTA Composite</td>
<td>.13</td>
<td>.90</td>
</tr>
<tr>
<td>Lower WGCTA Composite</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

alpha = .05

Based on the data reported above, no significant differences existed between upper and lower quartile respondents' performance on the WGCTA subscales or the WGCTA overall.

Table 17 indicates the Spearman-rank Correlation Coefficients between
quartiles and performance of the respondents on WGCTA and its subscales. Based on the association figure listed in Chapter III on page 26, a negative low association (-.18) was found between the upper and lower quartiles for the WGCTA Inference subscale. Positive negligible associations (.02 to .08) were found for Evaluation of Argument and Recognition of Assumption subscales. Negative negligible associations (-.03 to -.09) were found for all other WGCTA subscales and the WGCTA Composite score between the upper and lower quartiles.

Table 17

<table>
<thead>
<tr>
<th>Spearman-rank Correlation Coefficients corrected for ties between 1990 Nebraska 4-H Senior Livestock Judging activity success and critical thinking (WGCTA subscale and WGCTA Composite score) (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGCTA Inference Subscale</td>
</tr>
<tr>
<td>WGCTA Recognition of Assumption Subscale</td>
</tr>
<tr>
<td>WGCTA Deduction Subscale</td>
</tr>
<tr>
<td>WGCTA Interpretation Subscale</td>
</tr>
<tr>
<td>WGCTA Evaluation of Argument Subscale</td>
</tr>
<tr>
<td><strong>WGCTA Composite Score</strong></td>
</tr>
</tbody>
</table>

**Summary**

Fifty-one (70.83%) sample members responded to the study. Most (56.86 %) were male, but were proportional to the sample population. There were nearly equal numbers of respondents in the upper quartile (50.98 %) and
lower quartile (49.02 %). The average age of the respondents was 16.20 years of age.

The mean score for the sample as a group on the WGCTA Inference subscale was 7.86 out a possible 16. The mean score for the sample as a group on the WGCTA Recognition of Assumption subscale was 12.08 out of a possible 16. The mean score for the sample as a group on the WGCTA Deduction subscale was 10.49 out of a possible 16. The mean score for the sample as a group on the WGCTA Interpretation subscale was 11.53 out of a possible 16. The mean score for the sample as a group on the WGCTA Evaluation of Argument subscale was 11.55 out of a possible 16. The mean score of the sample as a group on the WGCTA Composite score was 53.69 out of a possible score of 80.

The relational analysis indicated that no significant differences existed between upper and lower quartiles on their performance in the WGCTA subscales or the WGCTA overall. A negative low association (-.18) was found between the upper and lower quartiles for the WGCTA Inference subscale. A negative low association was found between the upper and lower quartiles for the WGCTA Deduction subscale. Positive negligible associations (.02 to .08) were found for Evaluation of Argument and Recognition of Assumption subscales. Negative negligible associations (-.03 to -.09) were found for all other WGCTA subscales and the WGCTA overall between the upper and lower quartiles.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine the relationship of the critical thinking score as measured by Watson-Glaser Critical Thinking Appraisal score and subscores (Inferences, Recognizing Assumptions, Reasoning by Deduction, Drawing Conclusions and Evaluating Arguments), and mastery of judging activities between 2 groups (upper and lower quartiles) of participants in the 1990 Nebraska 4-H Senior Livestock Judging Activity.

Literature Review

The literature review was comprised of five sections: 1) Decision making and the steps necessary to perform the task; 2) Cognition and metacognition as they related to thinking skills and the relationship of knowledge to the effectiveness of decisions; 3) the critical thinking skills necessary in effective decision making; 4) evidence of decision making skills gained through 4-H program participation; and 5) the justification of using the Watson-Glaser Critical Thinking Appraisal as an indicator of decision making ability.

According to studies cited by Tobias and Elias (1990) and Buehner and Lucas (1989), and evidence cited in the review of literature, it was concluded that critical thinking is important in the decision making process. Findings indicate that 4-H program participants gain decision making skills through their involvement in the 4-H program. In Nebraska, judging activities are designed to test those decision making skills.
The procedure for this study was to measure the critical thinking skills of the 1990 Nebraska 4-H Senior Livestock judging activity using the WGCTA. The lack of correlational literature linking 4-H judging activities and decision making skills was the purpose for conducting the study.

Methods and Procedures

The population for the study was participants in the 1990 Nebraska Senior 4-H Livestock Judging Activity. The participants were ranked and divided into equal quartiles. The upper and lower quartiles were selected as the sample. Each quartile consisted of 36 individuals.

Each sample participant was invited to be a part of the study. The WGCTA was the instrument selected to measure critical thinking ability of the sample.

T-tests were used to determine significant differences between upper and lower quartile performance on the WGCTA subscales and the WGCTA overall. The Spearman-rank correlation coefficients were used to determine the degree of association between performance on the WGCTA subscales and WGCTA overall and mastery of the judging activity.

The Spearman-rank correlation coefficient test was used to compare performance on the WGCTA and mastery of the judging activity because it allows a researcher to calculate the correlation between two sets of ranks according to Ary, Cheser-Jacobs and Razavieh (1985). It is a special form of the Pearson Product correlation for use with ordinal data when the data is
ranked and tied. Spearman rho is interpreted in the same manner as Pearson $r$.

Findings and Conclusions

Fifty-one (70.83%) sample members responded to the study. Most (56.86%) were male, but were proportional to the sample population. There were nearly equal numbers of respondents in the upper quartile (50.98%) and lower quartile (49.02%). The average age of the respondents was 16.20 years of age.

Each subscale of WGCTA was comprised of sixteen items. If a respondent correctly answered each item, the score for a subscale would be 16. The total possible WGCTA Composite Score was 80 (five subscales of 16 items each).

The mean score for the respondents on the WGCTA Inference subscore was 7.86 out of 16 possible correct answers. The 7.86 score out of a possible 16 indicated that the sample lacked the ability to identify or draw inferences based on the given test items. That is, the ability to determine among degrees of truth or falsity of inferences from given data. The mean score for WGCTA Inference subscale was the lowest mean of the sample of all the WGCTA subscales.

The mean score of the sample respondents for WGCTA Recognition of Assumptions subscale was 12.08 out of a possible 16. This was the highest mean of the WGCTA subscales. The mean score demonstrated that the sample's strongest critical thinking skill was the ability to recognize assumptions
based on the given test items for that subscale.

The Watson-Glaser Critical Thinking Appraisal Manual (1980) rates the subscales on the strength of the subscale to test appropriate thinking skills. In Form A (used in this study), the Recognition of Assumptions subscale is the strongest with a .69 correlation factor and the Inferences subscale is the second strongest with a .65 correlation factor.

The fact that the sample mean score was highest for Recognition of Assumption subscale (12.08) may have been a preventative factor in the sample group scoring higher on the Inference subscale. They may have assumed some facts that essentially did not exist in the Inference subscale test items.

The low mean score on the inference subscale may also suggest that Extension programming may need to design training and education sessions that will strengthen the critical thinking skill used for inferences. That is, the ability to determine among degrees of truth or falsity of inferences from given data.

The variability between the mean scores of the sample on the WGCTA Inference subscale and the WGCTA Recognition of Assumption subscale may be due to the way the judging activity was conducted versus what is actually measured by the WGCTA. Variability in the individual sample members may also be a factor in the difference in the mean scores between the two WGCTA subscales.
The nature of the training programs that prepare individuals for the judging activity may be a factor in the difference between the two WGCTA subscales. For example, some sample members may live in a county where there are extensive training programs that prepare individuals for this judging activity, while other sample members may live in a county where little or no training programs exist to help them prepare for participation in this judging activity.

The fact that WGCTA measures critical thinking ability through reading abilities of the test taker may also be a factor in the variations in sample mean test scores. Some sample members may possess lower literacy skills which will be indicated in their WGCTA subscale and Composite scores.

The mean scores for the remaining WGCTA subscales, Deduction (10.49), Interpretation (11.53) and Evaluation of Arguments (11.55) were nearly identical. This may suggest that educational preparational activities for the Livestock Judging Activity participants are nearly identical for the population.

Another factor that the WGCTA Deduction, Interpretation and Evaluation of Arguments subscale mean scores are nearly identical is that the Livestock Judging activity may be more suited to testing these critical thinking skills.

Based on the data, the population of the 1990 Nebraska 4-H Senior Livestock Judging Activity ranked above the national average on overall performance of the WGCTA for their age group. The mean age of the sample (16.20 years) corresponds to the 11th grade level in high school. The mean
score of the sample on the WGCTA overall was 53.69. The sample group ranks in the 70th percentile according to the Watson-Glaser Critical Thinking Appraisal Manual (1980).

The relational analysis indicates that no significant differences existed between upper and lower quartiles on their performance in the WGCTA subscales or the WGCTA overall. Twelve research hypotheses were tested. No statistically significant (p > .05) differences were found between the upper and lower quartiles in their WGCTA subscores or the WGCTA Composite scores. Therefore, null hypotheses one through six were accepted.

A negative low association (-.18) was found between the upper and lower quartiles for the WGCTA Inference subscale. Positive negligible associations (.02 to .08) were found for Evaluation of Argument and Recognition of Assumption subscales. Negative negligible associations (-.03 to -.09) were found for all other WGCTA subscores and the WGCTA Composite score. Therefore, null hypotheses seven through twelve were accepted.

Recommendations

Based on the findings of this study, the following additional inquiry is recommended:

1. To control for history and maturation having an effect on respondents, the WGCTA be administered as early as possible following the completion of future Nebraska 4-H Senior Livestock Judging Activities.
2. A pre-test and a post-test be administered to participants prior to receiving any instruction or preparational training for future Nebraska 4-H Senior Livestock Judging Activities.

3. Study of other Judging Activity Areas in Nebraska (Horse, Home Economics, Meats, Horticulture) to determine if results of this study are similar and if participants in those activities have similar characteristics.

4. The WGCTA instrument be administered in a group setting to control for outside influences (assistance from other persons) of respondents.

5. Study of the types of training participants receive in preparation for the future Nebraska 4-H Senior Livestock Judging activities and other judging activity areas to determine if these trainings are a factor in performance in the judging activity and performance on the WGCTA.

6. Study of a longitudinal nature be conducted to determine the long range acquisition of critical thinking skills by Nebraska 4-H program participants.

7. Larger samples be used in study of the phenomenon to allow for a stronger ability to detect any statistically significant differences between critical thinking ability of Livestock Judging Activity participants.

8. Use of other instruments to measure critical thinking ability that do not utilize literacy skills in the administration of the test.
9. Administer the WGCTA to a control group who receives no training and does not participate in the judging activity to determine if there is a difference between judging activity participants and a group of their peers.
REFERENCES


APPENDICES
APPENDIX A

June 26, 1991

Ms. Susan J. Kowalski
Graduate Assistant
4-H/Youth Development Department
University of Nebraska
114 Agr Hall
Lincoln, NE 68583-0700

Dear Suzy:

This correspondence serves as official notice that permission is granted for your use of the participant list (including performance records, addresses and parent names) from the 1990 Nebraska 4-H Senior Livestock Judging activity for your master's thesis. The 4-H/Youth Department is greatly anticipating the findings of your study as we begin to peel away the veneer to view the substance of our traditional 4-H educational strategies.

Please do not hesitate to work with Ms. Nancy Wagner or myself to facilitate your manipulation of the demographic set. Good luck!

Sincerely,

Gary W. Giemlari, Ph.D.
Extension Specialist, 4-H/Youth Development and Coordinator, 4-H Judging, Skills & Identification Contests
June 26, 1991

Dear Agent,

During the next few weeks, I will be conducting a research project concerning the development of cortical thinking skills among 4-H members. This study will be the core of my thesis for a Master of Education degree in Vocational and Adult Education. The study will measure the relationship between success in 4-H Judging Activities and critical thinking skills of the participants. Well developed critical thinking skills have been linked to enhanced decision making skills. We are hoping to find that participation in judging activities helps build cognitive and decision making skills in adolescents.

The population of the study consists of 4-H members who participated in the 1990 Nebraska 4-H Senior Livestock Judging activity which was conducted during the 1990 Nebraska State Fair. A sample of 72 4-H members from the population will be asked to participate in the study. Four-H members in your county, who participated in the 1990 Nebraska 4-H Senior Livestock Judging activity form a portion of the sample group.

Each member of the sample group will be receiving the enclosed information:

1) Letter to Parent(s) or Guardian(s)
2) Letter to 4-H member
3) Watson-Glaser Critical Thinking Appraisal (WGCTA) Instrument and Scoresheet
4) Postage paid return envelope
5) Instruction Page for completion of WGCTA

The WGCTA measures five aspects of an individual's ability to think critically. These are: drawing sound inferences, recognizing assumptions, reasoning by deduction, drawing conclusions and evaluating arguments. Contents of the exercises on the test reflect material that is encountered in daily life. The test is designed for individuals in grades 9-12. Approximately 45 minutes is needed to complete the test.

This study will not involve you in your capacity as a County Extension Agent. We wish to inform you that 4-Hers in your County are being invited to participate in this study. Hopefully, the findings of the study will assist the 4-H program in assessing the training that 4-H members may need in the area of critical thinking.

Information returned on the completed answer sheets is completely confidential. Documents will be coded only for the purpose of retrieval of information.

If you have any questions, please call me or Dr. Gary Gerhard at (402) 472-2838.

Sincerely,

Susan J. Kowalski
Graduate Assistant
4-H/Youth Development

Gary W. Gerhard
Extension Specialist
4-H/Youth Development
<table>
<thead>
<tr>
<th>APPENDIX C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAMES OF AGENT CHAIRS IN SAMPLE COUNTIES</td>
</tr>
<tr>
<td>Buffalo, Bob Scriven</td>
</tr>
<tr>
<td>Lincoln, Kevin Koch</td>
</tr>
<tr>
<td>Red Willow, Bob Rathjen</td>
</tr>
<tr>
<td>Wayne/Dakota, Franklin Morse</td>
</tr>
<tr>
<td>Washington, James Peterson</td>
</tr>
<tr>
<td>Scotts Bluff/Morrill, Tom Holman</td>
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<tr>
<td>Webster, Jurdan Counts</td>
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<tr>
<td>Fillmore, Tom Dorn</td>
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<tr>
<td>Garfield/Loup/Wheeler, Steve Pritchard</td>
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<td>Custer, Phil Menke</td>
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<td>Merrick, Darrel Siekman</td>
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<td>Kearney, Alan Corr</td>
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<td>Frontier, Mick Glaze</td>
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<td>Knox, Terry Gompert</td>
</tr>
<tr>
<td>Hamilton, Andrew Christianson</td>
</tr>
</tbody>
</table>
APPENDIX  D

LETTER TO SUBJECTS AND PARENTS

July, 1991

Dear and Parents,

You are invited to participate in a study of 4-H members who are involved in judging activities. The study will look at critical thinking skills associated with your judging activities. Well developed critical thinking skills have been linked with enhanced decision making skills. Your participation in this study is important because it will help develop better 4-H programs for your age group.

You have been invited to participate in this study because of your involvement with the 1990 Nebraska 4-H Senior Livestock Judging Contest. Names of individuals who participated in the contest were provided by Dr. Gary W. Gerhard, State Coordinator of all 4-H Judging Activities.

Within the next few days, you will receive in the mail, a packet of materials for this study. Included in the packet will be the Watson-Glaser Critical Thinking Appraisal (WGCTA), answer sheet, and postage paid return envelope. It will take approximately 45 minutes to complete the WGCTA. Please plan to take time to strengthen Nebraska 4-H by participating in this confidential study.

If you have any questions concerning this study, please contact me or Dr. Gary Gerhard at (402) 472-2838.

Sincerely,

Susan J. Kowalski
Graduate Assistant
4-H/Youth Development
APPENDIX E

TEST PACKET COVER LETTER AND INSTRUCTION PAGE

July, 1991

Dear

Recently you received an invitation to participate in a study of 4-H members who are involved in judging activities. This study will look at critical thinking skills associated with your judging activities.

Enclosed in this packet is the Watson-Glaser Critical Thinking Appraisal (WGCTA), answer sheet, Instruction Page and postage paid return envelope. This test will take approximately 45 minutes to complete. Please take time to strengthen Nebraska 4-H by participating in this confidential study. Information gathered in this study will not be identifiable by participating individuals. The return envelope is coded for the purposes of retrieve of information. I will not be able to detect the responses of individual participants.

Please follow the instruction page in completing the answer sheet. Do not make any marks on the answer sheet except for completing items numbered 1-80. Do not identify yourself in any manner on the answer sheet.

If you have any questions regarding this study or the enclosed materials, please contact me or Dr. Gary W. Gerhard at (402) 472-2838.

Sincerely,

Susan Kowalski
Graduate Assistant
4-H/Youth Development

Gary W. Gerhard, PhD
Extension Specialist
4-H/Youth Development

Instructions for Participation

in Critical Thinking Study

1. There are five subtests in the Watson-Glaser Critical Thinking Appraisal (WGCTA). Each subtest has separate directions. Please read and follow them carefully.

2. All answers are to be marked on a separate answer sheet. Use a sharp No. 2 lead pencil to mark your answers. If you wish to change an answer, please be sure to erase your old answer completely.

3. Do not make any marks in the test booklet.

4. Do not make any marks on the answer sheet except for items numbered one through eighty. Do not identify yourself in any manner on the answer sheet.

5. Once you have completed the test, place the test booklet and completed answer sheet in the enclosed postage paid return envelope and mail the envelope.

6. If you do not wish to complete the test, please return the test booklet and answer sheet in the enclosed postage paid return envelope.
July 18, 1991

Dear Parents,

Earlier this month you received a letter as well as a test booklet and answer sheet that measures critical thinking skills, for you to complete.

Although the original July 12 deadline has passed, we still are seeking the return of completed answer sheets.

If you have already completed and mailed and returned the score sheet, please accept our THANKS for your participation and assistance.

If you have completed the score sheet and still wish to do so, please return the completed form and test booklet to me no later than July 25, 1991. And thank you for your assistance and support.

Sincerely,

Susan J. Kowalski
Graduate Assistant
4-H/Youth Development

Gary W. Gerhard, PhD.
Extension Specialist
4-H/Youth Development
APPENDIX G

EXEMPTION INFORMATION FORM

PROPOSAL TITLE: Study of the Relationship Between Critical Thinking Skills and 4-H Judging Activity Success in Nebraska 4-H Program Participants

INVESTIGATOR(S) NAME & DEGREE: Susan J. Kowalski, N.Ed.

DEPARTMENT & SCHOOL: Vocational and Adult Education, University of Nebraska-Lincoln

ADDRESS: 114 AgH, University of Nebraska-Lincoln, 68583-0700

TELEPHONE NUMBER: 402-472-2838 or 402-472-2552

PURPOSE OF THE STUDY: To determine the relationship of high critical thinking score as measured by the five subtests of the Watson-Glaser Critical Thinking Appraisal (inferences, recognition of assumptions, deduction, interpretation & evaluation of arguments); and mastery of judging activities between 2 groups of judges (upper & lower quartiles) in Nebraska 4-H 1990 Sr. Livestock Judging Activity.

DESCRIPTION OF SUBJECT POPULATION AND METHOD(S) OF RECRUITMENT: Population - 142 participants in the 1990 Nebraska 4-H Senior Livestock Judging Activity. These were divided into quartiles. Sample consisted of 72 individuals (36 in each quartile) The upper and lower quartiles will be used. A letter of notification inviting the 72 subjects to participate in the study will be mailed to subjects and their parents.

INFORMED CONSENT: Some technically exempt research projects ethically require informed consent (written or oral). If, in the Investigator's opinion, the study requires informed consent, the method used to obtain informed consent should be described and any written consent forms submitted. If the study does not require consent, it should be so stated and justified.
DESCRIPTION OF PROCEDURES:

The Watson-Glaser Critical Thinking Appraisal will be given to subjects. Subjects will be instructed to not identify themselves in any manner when completing the answer sheet. All responses will remain anonymous and confidential.

EXEMPTION CATEGORY: This proposal qualifies for exemption under 45 CFR 46.101(b) paragraph(s) 2 and is justified as follows:

The Watson-Glaser Critical Thinking Appraisal measures five aspects of the ability to think critically; drawing sound inferences, recognizing assumptions, reasoning by deduction, drawing conclusions and evaluating arguments. Test items reflect situations encountered on a daily basis at work and in the classroom. Subjects will record their responses on a OpScan answer sheet. They will not record or mark their identity in any manner on the answer sheet. The Watson-Glaser is a cognitive that measures critical thinking abilities of those who take the test.

Susan J. Kovalski

SIGNATURE OF INVESTIGATOR

July 2, 1991

DATE

Audie H. Heuser

SIGNATURE OF ADVISOR
(for student investigator)

July 2, 1991

DATE

The IRB reserves the right to request the investigator provide additional information concerning the proposal.
July 22, 1991

Susan Kowalski, M.Ed.
Vocational & Adult Education
114 AgH
UNL 0700

IRB # 010-91 EX

TITLE OF PROPOSAL: Study of the Relationship Between Critical Thinking Skills and 4-H Judging Activity Success in Nebraska 4-H Program Participants

Dear Ms. Kowalski:

I have reviewed your Exemption Information Form for the above-mentioned research project. According to the information provided this proposal is exempt from IRB review under 45 CFR 46:1013. It is understood that an acceptable standard of confidentiality of data will be maintained.

Sincerely,

Ernest D. Prentice, Ph.D.
Vice Chairman, IRB

EDP/Inmc