THE RELATIONSHIP BETWEEN LEARNING STYLE AND SELECTED DEMOGRAPHICAL CHARACTERISTICS OF SELECTED OHIO FIRST-YEAR HIGH SCHOOL AGRICULTURAL EDUCATION STUDENTS

A Thesis
Presented in Partial Fulfillment of the Requirements for
the Degree Master of Science in the
Graduate School of The Ohio State University

By
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* * * * *

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ABSTRACT

The purpose of the descriptive, correlational study was to describe the learning style and selected demographical characteristics of first-year Agricultural Education students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School. The study further sought to analyze the relationship between the learning style and selected demographical characteristics of the students. The selected demographical characteristics analyzed in the study were age, gender, cumulative grade point average, and residential location, defined as farm or non-farm.

The largest groups of first-year Agricultural Education students were male and non-farm residents. The average age of first-year high school Agricultural Education students was 14.73, and their average cumulative grade point average was 2.89. A majority (67.4%) of the first-year high school Agricultural Education students were non-farm residents. The learning style of the first-year high school Agricultural Education students was split almost evenly, with 49.5% (47) of the students exhibiting field dependence, and 50.5% (48) of the students exhibiting field independence.
The only significant relationship found between learning style and the selected
demographical characteristics was a positive, moderate relationship between
learning style and cumulative grade point average. There were no significant
relationships between learning style and age, gender, or residential location.
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FIELDS OF STUDY

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CHAPTER 1

INTRODUCTION

Researchers and educators have long known that teaching effectiveness improves when the learners’ individual differences in prior knowledge and cognitive development are taken into account (Messick, 1976). It has also long been known among educators that learners learn differently (Dunn & Griggs, 1989). However, educators usually require all learners to learn in exactly the same way, under the same conditions, and through teaching methods that simply appeal to the instructor (Starkey, 2000; Dunn & Griggs, 1989).

As Claxton and Murrell (1987) stated, teaching and learning practices in education urgently need improvement. One distinct mode for improvement would be to address the variety of learning styles and abilities that exist in every educational setting (Dunn & Griggs, 1989). But, the questions still remain as to how and why learning styles differ among learners.

While there has been significant research on learning styles, there has only been limited research on the demographical characteristics of high school agriculture students. However, of the research that has been conducted on the demographical characteristics of high school agriculture students, there have been studies concurrently investigating learning styles. These studies have
mostly dealt with variables such as age, gender, cumulative grade point average, and grade level, while virtually no research has been done on learning styles and type of residence or family background. Before a relationship can be established and understood between the concepts of learning style and high school agriculture student demographical characteristics, the concepts of each must first be understood.

Learning Style

Learning style describes the manner in which learners sort and process information (Garton, 1993). According to Witkin (1973), Gregorc (1979), and Garger and Guild (1984), learning styles were an important factor in several areas, including students’ academic achievement, how students learn, how teachers teach, and student-teacher interaction. Dunn and Dunn (1979) made a bold statement on these issues, stating, “Teachers teach the way they were taught,” (p. 241), and then refined their statement to, “Teachers teach the way they learned” (p. 241). With this said, it may seem that the study of learning styles would be simple and could relate back to the instructors in most cases, but as research has shown, the topic is actually complex, with several factors affecting an individual’s learning style. So how exactly have learning styles been studied?

Probably the most extensively studied and most relevant dimension of learning style has been that of field dependence / field independence. This concept of field dependence and field independence, and much of the work
relating to it, can be traced back to the work of Herman A. Witkin, known as the father of field dependence / field independence (Reiff, 1992). In Witkin's (1973) model, people with a field dependent learning style were said to be dominated by their surrounding field, viewed things globally, and had difficulty with analytical and problem solving based work (Witkin, Moore, Goodenough, & Cox, 1977). Field independent learners were just the opposite, so they were less affected by their surroundings, perceived things separate from the surrounding field, and were more apt to indulge in analytical and problem solving type work (Witkin, 1973; Witkin, Moore, Goodenough, & Cox, 1977).

Field dependence and field independence is just one aspect of learning style, meaning there are several more dimensions of the concept. With a range of dimensions of learning style being in existence, trying to understand all dimensions and making them relevant to specific teaching and learning situations could become quite complex. However, research has shown that the understanding of at least the field dependence and field independence dimension of learning style, coupled with efforts by teachers to utilize and apply their knowledge of this dimension, could impact learning in many ways (Reiff, 1992; Claxton & Murrell, 1987; Guild & Garger, 1985). For example, Reiff (1992) indicated that knowledge of learning style could help to reduce frustrations of both the teachers and the students, and could also improve the achievement and self-concept of the learner. Guild and Garger (1985) may have put it best when they stated that the acceptance of the diversity of learning styles among learners
could help create the environment and experiences that would enable and encourage each learner to reach their highest potential.

Demographical Characteristics

The term demographic, defined as, “Pertaining to the statistical science dealing with the distribution, density, vital statistics, etc., of populations,” (Guralnik, 1984, p. 375) can obviously encompass a wide range of variables, statistics, and measurements. These statistics can include any type of personal data, covering aspects of one’s life such as family background, type of upbringing, intelligence, abilities, and preferences. It would be hard to say what specific demographic variables have been studied the most, given the broad range of variables and topics to which they were applied. However, the current study explored the demographics of high school students, which brought out several obvious variables for analysis. One of the most common variables analyzed in any type of study involving high school students is grade point average. In addition, age and gender were logical choices because there were differences to report and it was of interest to the researcher to determine if these differences affected the learning style of first-year students of high school Agricultural Education.

There have been several studies conducted within the confines of Agricultural Education that have researched the areas of age, gender, and grade point average, and several studies that have explored the relationship between learning style and age, gender, and grade point average. Some of these studies
utilized high school students for the data source, while others utilized college students and beyond.

It is not abnormal to investigate a research topic and find such common variables as age, gender, and grade point average being utilized in numerous studies. While the implications and conclusions drawn from such studies may have been useful for a particular research topic at the time of the study, there is always the chance of changes occurring over time, some of which may or may not conflict with previous findings. Because of this possibility, it is relevant to repeat certain parts of previous studies in order to reinforce or dispute old findings. At the same time, with such a broad range of variables that affect learning style, there are plenty of demographical characteristics that have not been concurrently studied with learning styles.

One demographical characteristic of interest to the researcher was location of residence. This characteristic could be studied in several different ways, depending on how many categories of location were considered. Residential location could be divided into several categories such as urban, suburban, and rural, and these categories could be broken down further to include distinctions such as metropolitan, farm, and non-farm. Or, residential location could be looked at in a simpler way, such as farm or non-farm, disregarding the categories of urban, suburban, and rural. The latter categorization – farm, non-farm - could still include the entire population of the world if desired, because every residence can distinguish whether it is
considered a farming residence or not. The latter approach was utilized in the current study.

Since the researcher desired to explore the relationship between learning style and demographic characteristics of high school students of agriculture, the approach to the residential location variable as being simply farm or non-farm was relevant to the study because a good representation of each population could be expected in first-year high school Agricultural Education classes. One major factor making this approach to the study difficult was the fact that there has been virtually no research conducted on both learning style and residential location of students. While there have been studies conducted on residential location of students combined with other variables, and studies on learning style of high school students in Agricultural Education, there still exists a lack of information pertaining to both learning style and residential location.

**Statement of the Problem**

As indicated, there has been little or no research conducted relating to both learning styles and demographical information. While this may open several questions, one significant question exists: What is the relationship between learning style and the selected demographical characteristics of the learner?

**Purpose of the Study**

The purpose of this study was to describe the learning style of selected Ohio students enrolled in their first-year of Agricultural Education at Bellevue
High School, Genoa High School, and Oak Harbor High School, and to
determine the selected demographical characteristics of the same students.
Further, this study sought to explore the relationship between learning style and
the selected demographical characteristics.

**Research Questions**

This study was guided by the following research questions:

1. What were the ages, genders, grade point averages, and
   residential locations – farm or non-farm – of first-year students of
   Agricultural Education at Bellevue High School, Genoa High
   School, and Oak Harbor High School?

2. What was the learning style of first-year students of Agricultural
   Education at Bellevue High School, Genoa High School, and Oak
   Harbor High School as determined by the Group Embedded
   Figures Test (GEFT)?

3. What was the relationship between the learning style and selected
demographical characteristics – age, gender, grade point average,
and residential location - of first-year students of Agricultural
Education at Bellevue High School, Genoa High School, and Oak
Harbor High School?
Definition of Terms

**Learning Style:** The consistent pattern of behavior and performance by which an individual approached an educational experience (Cano, 1992). For this study, learning style has been operationally defined as field dependence or field independence, which was determined by an individual’s score on the Group Embedded Figures Test (GEFT) (Oltman, Raskin, & Witkin, 1971).

**Field Dependence/Field Independence:** The extent to which an individual was able to deal with a part of a field separately from the field as a whole, or the extent to which he/she was able to distinguish items from an organized context (Witkin, 1973). Field dependence was operationally defined as a score of zero (0) to eleven (11) on the GEFT. Field independence was operationally defined as a score of twelve (12) to eighteen (18) on the GEFT.

**Demographical Characteristics:** The demographical characteristics of an individual referred to the age, gender, grade point average, and location characteristics of his/her primary residence as defined by Ohio Facts (Clements, 1988) and the researcher. The residential location characteristics studied were farm and non-farm, and the following operational definitions were utilized in the study.

**Farm** – According to the Farmer's Tax Guide (2000), an individual is in the business of farming if they cultivate, operate, or manage a farm for profit, either as owner or tenant, and had at least $1,000 in receipts from farming
activity. An individual is not farming if they cultivate land or operate a farm for recreation or pleasure rather than for profit. A farm may include, but is not limited to, livestock, dairy, poultry, fish, fruit, forage, grain, vegetable, and truck farms.

In the current study, the focus was on the location of the individual’s primary residence, so an operational definition was utilized. For this study, an individual’s residence was considered a farm if the property on which the residence was established was located outside of any corporation limits, the student or a family member was directly involved in a farming activity as described by the Farmer’s Tax Guide (2000), and the student or family had at least $1,000 in receipts from that farming activity annually.

Non-farm – Since only two parameters for demographical groups were utilized in the study, all students not meeting the criteria to be considered in the farm population were thus put into the non-farm population. The non-farm group could include students from any other type of residence, and since incidental to the current study, specific information on this group was not collected.

Assumptions

In regards to the current study on learning styles and demographic characteristics of first-year students of high school agriculture, some
assumptions were made. First of all, it should be noted that only a small sample of the agricultural students from each school was utilized in the study. Therefore, in order for the data collected to be relevant to the study and applicable to other studies, it was assumed that the population of the study was representative of all students of agriculture at the selected high schools and that these students were representative of all other high school agriculture students. It was also assumed that all participants took the GEFT seriously and completed it to the best of their ability.

Regarding the selected demographic characteristics, it was assumed that all students were honest in reporting facts about themselves, and the selected characteristics. It was also assumed that the selected students were representative of all students of similar backgrounds and demographical characteristics.

Witkin, Oltman, Raskin, and Karp (1971), and Witkin, Goodenough, and Karp (1967) have shown that learning styles are stable between the ages of 14 and 18. Given that this study was conducted on high school students, it was assumed that all students in the study were between the ages of 14 and 18, and thus, the learning style of all students in the study were stable.

**Limitations**

The study was limited to three high schools and to only first-year students due to funding and time limitations on the researcher. The high schools selected for data collection were chosen for their location so that each school would
provide good representation of each of the residential location characteristics being studied—farm and non-farm. Although it did not guarantee a consistent representation from each school, criteria outlined in a previous study by Raven and Barrick (1992), and defined by the metropolitan statistical area according to Ohio Facts (Clements, 1988), were referred to, but not strictly abided by, to assist the researcher in choosing schools with characteristics applicable to the study.

The previous studies utilized schools based on location and categorized as rural, semi-rural, suburban, and urban. In the studies, the rural schools were located in counties outside of the metropolitan statistical area and in counties with a population of less than 40,000. The semi-rural schools were located in counties outside of the metropolitan statistical area, which had a population between 40,000 and 200,000. The suburban schools were located in counties inside the metropolitan statistical area, which had a population between 40,000 and 200,000. The urban schools were located in counties within the metropolitan statistical area which had a population greater than 200,000. Upon reviewing this information, using knowledge of school districts in Ohio that were accessible to the researcher, and considering the operational definitions created by the researcher, the previously mentioned high schools were chosen.

Bellevue High School, located within the corporation limits of the northern Ohio town of Bellevue, and on the county line separating Sandusky and Huron Counties, was chosen for its suburban-like characteristics, although the previous study would have classified the school as semi-rural. Although it is not located within close proximity to a large city, Bellevue High School is located within
corporation limits of a town surrounded by a growing suburban area, with the rest of the school district encompassing a large amount of farmland. Given these demographics of the area surrounding the school, the researcher believed that Bellevue High School would provide a relevant sample of both farm and non-farm students.

Genoa High School, located just outside the corporation limits of the northwestern Ohio village of Genoa, appeared to be more of a rural school than Bellevue High School. Located on the western edge of Ottawa County, Genoa is surrounded by a large amount of farmland as well, although both the town and school district are smaller in size than Bellevue. However, despite the rural setting of the actual school buildings within farmland, the school is actually more suburban in population. Located just eleven (11) miles east of the Toledo, Ohio metropolitan area, the Genoa area is quickly becoming a part of the suburban area of northern Wood County that separates Genoa from Toledo, and farmland surrounding Genoa is becoming more developed everyday. Given these demographics on Genoa, the researcher believed that the sample of first-year students of Agricultural Education at Genoa High School would yield some farm students, but mostly non-farm students.

The final school chosen for the study, Oak Harbor High School, is located on the edge of the corporation limits of the northwestern Ohio village of Oak Harbor, and is bordered one side by the village, and on the other by farmland. The school district containing Oak Harbor High School – Benton-Carroll-Salem School District – is comparable in size to that of Bellevue School District, but the
town is much smaller in size and population, and the land surrounding Oak Harbor consists completely of farmland and marshes. Located in Ottawa County, just eight (8) miles east of Genoa, the closest metropolitan area to Oak Harbor is Toledo, but suburban growth has not yet reached the Oak Harbor area. Because of this and other characteristics described, the researcher believed there would be good representation of farm students at Oak Harbor High School, and fewer non-farm students than either of the other schools utilized in the study.

Although it was not necessarily a limitation to the study, it was determined that ninth (9th) grade was the official grade that defined the beginning of high school in each of the schools studied. Finally, the study was limited to those students present at the schools on the days selected for the administration of the GEFT.
CHAPTER 2
REVIEW OF RELATED LITERATURE

Learning Style

It has long been known by behavioral scientists and educators that more effective teaching occurs when individual differences in students’ knowledge and level of cognitive development are taken into account (Messick, 1976). Rationalizing from this statement, it must also be true that significant research on learning styles occurred well before 1976. The topic of the research may not have been called learning style, but if relationships between effective teaching and differences in students’ knowledge and level of cognitive development were found, then the research was, in fact, studying learning style.

Prior to the earlier statement, Messick (1970) stated that there were several dimensions of individual differences in the process of cognition. According to Torres (1993), these “differences in the process of cognition” that Messick (1970) referred to represented learning style. Garton (1993) and Starkey (2000) further indicated that cognitive abilities or cognitive styles were more specific terms for the broader construct of learning style. Given this inference, many researchers refer to the terms cognitive style and learning style.
synonymously, and definitions of learning style may therefore be found under both terms (Starkey, 2000).

“Learning style is the most important concept to demand attention in education” (Guild & Garger, 1985, p. viii). Despite such a powerful statement, there has not been a generally accepted definition or a consensus to which conclusions made on the topic are most valid. Despite Guild and Garger’s (1985) beliefs, Curry (1983) stated that researchers did not have a full understanding of the learning style concept. One possible reason for the lack of understanding is that many researchers have interpreted and defined learning style in different ways (Starkey, 2000). This inference is backed by the conclusion of Sims and Sims (1995), that a lack of agreement on how to define learning style was evident.

**Learning Styles Defined**

As indicated, several researchers defined learning style in terms of cognitive style. One such definition came from Messick (1970), who defined cognitive styles as ‘Intrinsic information-processing patterns that represent a person’s typical mode of perceiving, thinking, remembering, and problem solving” (p. 188). Kogan (1971) gave a definition similar to Messick’s (1970): “An individual’s variation in modes of perceiving, remembering, and thinking, or as distinctive ways of apprehending, storing, transferring, and utilizing information” (p. 244). Vernon (1973) then went on to say that learning styles encompassed “Many cognitive operations which account for individual differences in a variety of
cognitive, perceptual, and personality variables” (p. 141). Witkin (1976) referred to cognitive styles as “Cognitive characteristic modes of functioning that we reveal through our perceptual and intellectual activities in a highly consistent and pervasive way” (p. 39).

Refraining to the concept as “learning style,” Claxton and Ralston (1978) said that it was “A consistent way of responding to and using stimuli in the context of learning” (p. 71). Kenneth and Rita Dunn (1978) defined learning style as the way individuals concentrated on, absorbed, and retained new information or skills.

According to Griggs (1991), the most comprehensive definition of learning styles, offered by Keefe (1979), was “The composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment” (p. 4). Gregorc (1979) similarly stated that learning styles were “Distinctive behaviors which serve as indicators of how a person learns from and adapts to his/her environment” (p. 234).

Garger and Guild (1984) referred to learning style as stable and pervasive characteristics expressed in one’s behavior and personality. Cano (1993) defined learning style as a consistent pattern of behavior and performance by which an individual approached an educational experience. Finally, The Center for Study of Learning and Teaching Styles at St. John’s University (1998) most recently defined learning style as, “A combination of affective, cognitive,
environmental, and physiological responses that characterize how each person learns."

**Learning Styles Dimensions**

Understanding the way students learn is essential to educational improvement, and learning style assessment is one of the keys to an understanding of student learning (Griggs, 1991). Griggs (1991) further stated that to understand how the current cognitive mode, or learning style of an individual could be determined, the four dimensions of learning style and how they correlated must first be understood. These four dimensions, according to Curry (1987), were information processing, social interaction, instructional preference, and personality.

Information processing referred to a student’s preferred intellectual approach to assimilating information (Griggs, 1991). Kolb developed the most common model for information processing in 1984. Kolb’s model involved the completion of twelve stem continuums, with method of perception determined by concrete or abstract thinking, and system of processing information determined by preferences for active experimentation or reflective observation (Claxton & Murrell, 1987). Kolb (1984) called this process the experiential learning cycle (Figure 2.1). The first step in the experiential learning cycle was a concrete experience, meaning the learner was involved in a learning experience. In the second step, called reflective observation, the learner reflected on the previous experience from different perspectives. The third step, abstract
conceptualization, involved the creation of generalizations by the learner that integrated the observations. Finally, during active experimentation, the last step in the cycle, the learner tested what he/she had learned in the more complex situations they created. The process was called a cycle because the result of the test from the last step was used as a second concrete experience, beginning the cycle again (Kolb, 1984).

![Kolb's Experiential Learning Cycle](image)

**Figure 2.1:** Kolb's Experiential Learning Cycle (Kolb, 1984)

Although the experiential learning process was identified as a cycle, the four points on the cycle still represented distinct entities, which Kolb (1984) said were modes of dealing with information. Kolb (1984) used these points to
develop four learning styles. Students were identified with a learning style – diverger, assimilator, converger, or accommodator, based on their location in the continuum, called Kolb’s Learning Style Inventory (Kolb, 1984) (Figure 2.2).

![Diagram of Kolb's Learning Style Inventory]

Figure 2.2: Kolb’s Learning Style Inventory (Kolb, 1984)

Divergers perceived information concretely and processed it reflectively, convergers perceived abstractly and processed reflectively, assimilators perceived abstractly and processed actively, and accommodators perceived concretely and processed actively (Kolb, 1984). In more general terms, divergers were called imaginative learners because they referred to personal
experiences and showed a need to be personally engaged in the learning process. Assimilators were pragmatists that placed a high value on skills development and problem solving. Convergers were attentive to detail and thoroughness and were sequential thinkers. Accommodators were dynamic learners, flexible, risk takers, and open to change (Griggs, 1991).

The most predominant social interaction model was a paradigm designed by Reichmann and Grasha (1974) that identified six types of learners based on their varied learning styles within the classroom environment. The classifications were: independent learners – prefer to think and learn by themselves; dependent learners – lean heavily on authority figures to define parameters of learning; collaborative learners – prefer to learn cooperatively in peer groups; competitive learners – motivated to learn in order to excel above others, and view learning as a win-lose encounter; participant learners – perceive the learning environment as an opportunity for interaction with others; avoidant students – non-achievers, not actively involved in the learning process (Reichmann & Grasha, 1974).

The instructional preference models are concerned with the teaching methods that students preferred their instructors to utilize (Claxton & Murrell, 1987). The Learning Style Profile developed by Keefe and Monk (1986) utilized twenty-four elements of learning style to classify students into the areas of cognitive skills, perceptual responses, or study and instructional preferences. Students who preferred cognitive skills type instruction liked to deal with processing, analyzing, categorizing, and memorization (Keefe & Monk, 1986). Those who favored perceptual responses preferred to learn through visual,
auditory, and emotive responses to information (Keefe & Monk, 1986). Students with study and instructional preferences were diverse and had demands on motivational and environmental factors of teaching style, including but not limited to: manipulative preference, time, grouping, mobility, sound, lighting, and temperature (Keefe & Monk, 1986). According to Griggs (1991), application of the Learning Style Profile is based on the premise of cognitive skill development for learning - if students cannot process information effectively, even the most supportive learning environments will have minimal learning effectiveness. Also, Dunn and Dunn (1979) have stressed the importance of this dimension by relating it to teaching styles, saying, “Teachers teach the way they were taught” (p. 241), or in other words they teach the way they learned.

The personality dimensions of learning style assess the influences of personality on approaches to acquiring and integrating information, meaning an adolescent’s personality affects the manner in which that person perceives the environment around them, in turn affecting the way they acquire information (Griggs, 1991). Several models have been designed and successfully utilized in this dimension of learning styles (Griggs, 1991; Curvy, 1987), most of which deal with the concept of field dependence / field independence and can be attributed to the work of Herman Witkin. Chosen for use in many studies as a significant and most relevant dimension for assessing and studying learning styles (Garton, 1993; Torres, 1993; Estadt, 1997; McCutcheon, 1997; Hudson, 1997; Kitchel, 1999, Starkey, 2000), the field dependence / field independence dimension will be discussed in more detail in later sections.
Although a clear distinction between the four dimensions of learning styles were found, Kenneth and Rita Dunn (1978) explored the possibility of a multi-dimensional model for learning styles assessment. Conducting research and actively promoting learning styles instruction for more than twenty years (Starkey, 2000), the Dunn's have been considered credible sources on the topic, and as implied, the Dunn's developed their own instrument to assess learning style – the Learning Style Inventory (LSI) (Griggs, 1991) (Figure 2.3). The LSI is a self-reporting questionnaire that incorporates twenty-two elements relating to the environmental, emotional, sociological, and physical preferences of the individual (Dunn & Dunn, 1978; Griggs, 1991). A consistency key is then used to determine the carefulness with which each respondent answered the questions, in turn diagnosing the individual's learning style (Griggs, 1991).

<table>
<thead>
<tr>
<th>STIMULI</th>
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<td>Environmental</td>
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<td>Physical</td>
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<td>Psychological</td>
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Figure 2.3: Dunn and Dunn's Learning Style Inventory (Dunn & Dunn, 1978)
Although it is not the only multi-dimensional model in existence, Griggs (1991) stated that the LSI was the one with the most promise for the application of learning styles for four reasons. First, it was a multidimensional model that encompasses physical, environmental, emotional, sociological, and psychological dimensions of learning. Second, the LSI stresses the importance of individual differences in the learning process. Third, it was founded through research that supported the identification of instructional interventions that were compatible with individual strengths and preferences toward increased academic achievement and improved student attitudes towards learning. Finally, the fourth reason that the LSI model was the best one for the application of learning styles was that it was a concise, extensively field tested model that showed evidence of reliability and validity. Not solely because of Griggs' opinion, but because the LSI has been used effectively by others and praised, it has become the most widely used instrument in elementary and secondary schools (Keefe, 1982). Used by over one hundred universities, Dunn and Dunn's model is also the most researched educational model in the history of the United States (Oklahoma Institute for Learning Styles, 2001).

Field Dependence / Field Independence

Known as the father of field dependence / field independence (Reiff, 1992), “Witkin has conducted the most extensive and in-depth research on cognitive styles in the last fifty years,” (Guild & Garger, 1985, p. xii). Among Witkin’s accomplishments is the development of several tools to determine or
explain the field orientation of an individual, including the Body Adjustment Test (BAT), the Rod and Frame Test (RFT), the Embedded Figures Test (EFT), and the Group Embedded Figures Test (GEFT) (Witkin, 1976). These tests measure the extent of a person’s field dependence. Witkin (1973, 1976) has determined that a field dependent person is dominated by their surrounding field and perceives things more globally; a field independent person is not distracted by their surrounding field and is more analytical in perception.

Sparked by interest in why some World War II pilots became disoriented while flying when they lost sight of the ground, the BAT assessed an individual’s perception of his or her own orientation in space. In the BAT, an individual was seated in a chair within a small room. Both the chair and the room could be tilted independently of one another, and when one or both were tilted, the individual was asked to adjust their body to the upright position. Field dependent individuals were those that adjusted their bodies to the surrounding tilted position of the chair or room, but field independent persons were those that were able to properly adjust themselves to the upright position independently from the position of the room and chair (Guild & Garger, 1985). According to Witkin (1948, 1949), the BAT has been found to be a reliable and valid instrument for assessing field dependence/field independence.

Another method of assessing field dependence/field independence, the RFT, assessed an individual’s perception of the true vertical position of a rod within a tiltable frame. A subject was seated in a darkened room and shown a luminous rod within a luminous frame, both of which could be tilted
independently. When asked to adjust the rod to a vertical position, field
dependents would rotate the rod so it was perpendicular to the frame. but field
independents would rotate it to a true vertical position (Witkin, Dyk, Faterson,
Goodenough, & Karp, 1974). Like the BAT, the RFT has also been found to be a
reliable and valid means for assessing field dependence/field independence

While the BAT and RFT assess field dependence/field independence
through physical perceptions, pencil and paper tests have also been developed.
Two of these pencil and paper tests are the EFT and GEFT. The EFT was
designed for use with individuals (Witkin, Oltman, Raskin, & Karp, 1971), and the
GEFT was developed for group administration (Oltman, Raskin, & Witkin, 1971).
The task of the individual in each test was to recognize previously seen simple
figures that were embedded into more complex figures. Field independent
people were able to recognize the simple figures from within the complex figures
while the field dependent people could not recognize them (Griggs, 1991). There
has also been a similar test created for use with individual children between the
ages of 5 and 10 years old (Karp & Konstadt, 1971). The Children’s Embedded
Figures Test, along with the EFT and GEFT are all considered standardized tests
and have been tested for reliability and validity (Garton, 1993; Witkin, Oltman,
Raskin, & Karp, 1971).
Characteristics and Behaviors of Field Dependent Learners

As indicated by the previously mentioned tests, field dependent people are dominated by their surrounding field, view things more globally, are more easily influenced by authority figures or peers, and favor interpersonal areas of coursework, such as social sciences and the humanities. According to Garger and Guild (1984), field dependents made broader distinctions among concepts and could better recognize relationships. In addition, field dependent learners had more difficulty with multi-step problems, being unable to break them up into smaller parts. Becoming frustrated, field dependent learners would quickly give up on this type of difficult task (Witkin et al., 1977). Due to this inability to break down tasks, field dependent learners are said to be poor analytical problem solvers (Cano, 1993; Witkin et al., 1977).

There is often a misconception that results when people learn that field dependents are poor at analytical and problem solving skills. The misconception is that they are poor at math and science. This is not necessarily true, but rather that they just have a more difficult time and are more challenged by these subject areas (Cano, 1993; Torres, 1993).

Torres (1993) claimed that field dependent learners preferred social contexts and orientations. Stated more specifically but also more complex, Witkin et al. (1977) said that field dependent learners, reflecting their use of external sources of information for self-definition, are “Selectively attentive to the human context of the environment” (p. 10). In addition, Witkin et al. (1977)
indicated that field dependent learners were drawn to people and preferred to be physically close to others.

Regarding the actual process of learning, field dependents learn best within a social context, are more attentive when the learning material relates to their personal experiences, and require externally defined goals and reinforcements (Garger & Guild, 1984; Reiff, 1992, Torres, 1993). Witkin et al. (1977) stated that field dependent learners preferred the spectator approach to the learning of concepts and required structured, organized instruction. Field dependents also needed more distinct instruction in problem-solving strategies and exact definitions of performance criteria.

With the previously stated characteristics, it is no surprise that field dependent learners gave preference to socializing with peers over engagement in the instruction (Cano, 1993). It is also not surprising that when forced to be a part of the learning process, they preferred to work in small groups and take part in class discussion (Cano, 1993; Witkin, 1976). Also in regards to their social instincts, field dependent learners often seek guidance and opinions from others and are motivated extrinsically through praise from the instructor and grades (Cano, 1993; Garger & Guild, 1984; Witkin et al., 1977).

**Characteristics and Behaviors of Field independent Learners**

As common sense would imply, field independents exhibit characteristics and behaviors directly opposite those of field dependent learners (Torres, 1993). Field independent learners, therefore, are not distracted by their surroundings,
view things more analytically, are more autonomous, and favor studies involving analytical skills, such as math and science (Witkin, 1976).

Gager and Guild (1984) indicated that field independent learners could make more specific concept distinctions, and because of their more developed perceptions of discrete parts, they could better break major tasks down into simpler ones (Cano, 1993; Witkin, 1976, Witkin et al., 1977). In addition, due to their more advanced analytical skills, field independent learners were more adept at problem solving tasks (Even, 1982; Garton, 1993; Cano & Garton, 1994).

The social characteristics of field independent learners were also the opposite of field dependent learners. Many researchers (Cano, 1993, Gager & Guild, 1984, Witkin, 1976, Witkin et al., 1977) claimed that field independent learners were generally individualistic and insensitive to the needs and emotions of others. In addition, field independents learn social material only because they have to, and are interested in new concepts only for their own sake (Gager & Guild, 1984; Witkin et al., 1977).

Within the learning environment, Witkin et al. (1977) stated that field independent learners preferred to work without close guidance from the instructor and were better suited at providing their own structure for the learning situation. Field independent learners tend to become inattentive to the social environment when working (Cano, 1993; Reiff, 1922; Witkin et al., 1977), and are usually impatient to begin working on tasks when the instructor is still giving instructions (Cano, 1993).
Again opposite field dependent learners, field independent learners were intrinsically motivated (Starkey, 2000) through competition, choice of activities, showing how the task was useful to them, and freedom to design their own structure (Cano, 1993; Garger & Guild, 1984; Reiff, 1992; Witkin, 1976; Witkin et al., 1977). In addition, field independent learners had self-defined goals, were less affected by criticism, and non-responsive to social and positive reinforcement from the instructor (Guild & Garger, 1984, Cano, 1993).

**Learning Styles Applied**

According to Witkin (1976), people tend to be consistent on the BAT, RFT, EFT, and GEFT, and all four tests for field assessment have been tested for reliability and validity (Witkin, 1948; Witkin & Asch, 1948; Witkin, 1949; Oltman, 1964; Witkin, Oltman, Raskin, & Karp, 1971). However, Curry (1987) concluded that the GEFT had the strongest reliability coupled with good validity. Given the reliability and validity of the tests, some very significant relationships, generalizations, and conclusions regarding applications of learning style have been made as a result of studies utilizing these instruments, mainly the GEFT. While studies have been done on several different variables to find their relationship, if any, to learning style, a few studies have been conducted and yielded results significant to the parameters of the current study. Topics of these studies include gender, academic achievement, age, and grade level.
Relationships Between Learning Style and Age

If it is known that certain variables have had an effect on GEFT scores and ultimately, an individual's learning style, then it can only be expected that an individual's learning style may have undergone changes throughout the course of that person's life. To explore this possibility, several studies have been conducted on different variables, one of which was age. Witkin, Oltman, Raskin, and Karp (1971) reported that there were clear age related changes in learning style over the length of an individual's life. Witkin, Goodenough, and Karp (1967) found that between the ages of eight (8) and fifteen (15), there was a continuous increase towards field independence. After the age of fifteen (15), however, Witkin et al. (1967) reported a leveling off of the increase. Witkin et al. (1967) further claimed that an individual's learning style remained absolutely stable during early adulthood. After early adulthood, approximately between the ages of twenty-four (24) and thirty (30), another period of change in learning style has been reported by Witkin et al. (1971), this time with an acceleration towards field dependence. Studies of elderly individuals have shown a return to a field dependent learning style (Schwartz & Karp, 1967).

Other, more recent studies have had contradicting results. In a study on learning style of high school students, Cano (1998) concluded that as grade level increased, GEFT scores also increased. Although the correlation reported by Cano (1998) was low ($r = .21$), it still indicated a positive relationship between grade level and learning style. In a similar study, Starkey (2000) found a
positive, but negligible relationship ($r = .07$) between GEFT scores and grade level.

On the contrary, Torres (1993), in a study on senior students in the College of Agriculture at The Ohio State University, reported a negative, low relationship ($r = -.19$) between age and GEFT scores. Torres (1993) conclusion was that as age increased, scores on the GEFT decreased.

### Relationships between Learning Style and Gender

Another often-studied variable in relationship to learning style was gender. While gender differences were typically found in the field dependence/field independence dimension of learning style (Garger & Guild, 1984; Witkin, 1976; Claxton & Ralston, 1978; Reiff, 1992; Torres, 1993), the differences reported were not always the same. The most prevalent result of several early studies was that males tended to be more field independent than females (Witkin et al., 1971). Despite the previous deduction, Witkin et al. (1971) warned that gender related differences in learning style might not have been present until the age of eight (8).

Going back to the theme that males over time have shown more tendency towards field independence than females, Torres (1993) found a significant but low, positive relationship ($r = .26$) between gender and GEFT scores. Torres (1993) found that 71.2% of the males in the study possessed a field independent learning style compared to approximately 50% of the females in the study.
Torres (1993) concluded that males preferred a field independent learning style, while females preferred a more field dependent learning style.

Conversely, Raven, Cano, Garton, and Shelhamer (1993), in a study of gender and learning style on preservice teachers of agriculture in the states of Montana and Ohio, found that 54.5% of male preservice teachers in Montana and 50% of male preservice teachers in Ohio were field dependent. Consequently, 45.5% of male preservice teachers in Montana and 50% of male perservice teachers in Ohio were found to be field independent. In the same study, Raven, Cano, Garton, and Shelhamer (1993) found that an astonishing 100% of female preservice teachers in Montana and 71.4% of preservice teachers in Ohio were field independent. Further supporting the findings of Raven, Cano, Garton, and Shelhamer (1993), Cano's (1998) study of learning style of high school students showed that females were more likely to score higher on the GEFT than males.

In summary, many studies have been conducted on the relationships between gender and learning style. As indicated above, several studies have shown that males were more likely to be field independent, while some have shown that females were more likely to be field independent, and yet others have shown that no significant relationship existed between gender and learning style (Starkey, 2000). The long-term conclusion has been that there is no consistent description of the relationship between learning style and gender.
Relationships between Learning Style and Cumulative Grade Point Average

While other variables, when studied in conjunction with learning style, have often had contradicting results; virtually all studies involving learning style and academic achievement have shown that learning style influenced academic achievement (Starkey, 2000). Despite this inference, Witkin (1976) suggested that learning style should be considered an ingredient of intellect, and not a direct measure of intelligence.

Hodges (1986), although not studying learning style directly, conducted a study on learners who preferred to work alone versus those that preferred to work in groups. Hodges (1986) found that learners who preferred to work alone, a characteristic of field independent learners, achieved significantly greater scores on tests than learners who preferred to work in groups, a field dependent characteristic. In a similar study, field independent learners were found to achieve greater scores on standardized measures of academic ability (Renninger & Snyder, 1983).

Several studies focusing directly on learning style and academic achievement have yielded results similar to those above. In studies on Agricultural Education students (Cano, Garton, & Raven, 1992; Cano & Garton, 1992; Cano & Torres, 1994; Raven, Cano, & Shelhamer, 1993), it has been found that greater scores in teaching methods courses have been obtained by field independent students. In one of the same studies (Cano, Garton, & Raven, 1992) also found that field independent Agricultural Education students scored greater on tests, assignments, and microteachings than field dependent
students. In another study on Agricultural Education students, Estadt (1997) concluded that students who possessed a field independent learning style had higher cumulative grade point averages (CGPA) upon college graduation than students who possessed a field dependent learning style. Another study on CGPA, also involving college agricultural students, found a significant, moderate, and positive relationship \( r = .34 \) between CGPA and GEFT scores (Torres, 1993).

Similarly, Cano and Porter (1997) also found relationships between learning style and CGPA among students enrolled in the College of Agriculture at The Ohio State University. In 1995, Cano and Porter (1997) found a low, positive, and significant relationship \( r = .24 \) between learning style and CGPA, and by 1996, that same relationship had been strengthened to moderate \( r = .30 \). Finally, in a study of high school Agricultural Education students, Starkey (2000) found another similar relationship \( r = .31 \) between GEFT scores and CGPA. The positive relationships from Torres' (1993), Cano and Porter's (1997), and Starkey's (2000) studies indicated that as CGPA increased, GEFT scores also increased.

**Residential Location**

Despite numerous studies in the way of learning style, with several different variables analyzed and relationships described, virtually no research has been conducted concerning a relationship between learning style and residential location, or any other similar domestic characteristic. However,
studies have been conducted in regards to variables such as academic achievement and rural versus non-rural high schools. Other studies have simply compared rural and urban schools, while even more have analyzed demographical characteristics of rural schools.

Educational researchers have tended to agree that small schools located in rural communities were unique from large schools located in urban or metropolitan areas (Odell, 1986). Researchers have also agreed that declining economic conditions in many rural areas of the United States have led to a shortage of resources for residents of rural areas, including educational resources (Aikman, 1982; Brown, 1983). As a result, the lives of many students who attended schools located in rural communities have been affected. Carmichael (1982) reported that rural schools tended to offer more limited curricula than metropolitan schools, had poorer library resources and access, and employed fewer support personnel for educational services.

A study similar to those conducted by Odell, Aikman, Brown, and Carmichael, also found that rural schools were much different from urban schools. Barcinas (1989) reported that more resources were available to urban schools, as indicated by the diversity of curricula offerings and per pupil expenditures. In addition, Barcinas (1989) found that rural schools had fewer teachers, support staff, and administrators than urban schools, relative to the size of the school.

Despite the apparent lack of resources and opportunities for quality education at rural schools, as indicated by previously mentioned studies, Odell
(1986) and Fails (1989) found that most students at rural high schools expected to attend college upon graduation. McCracken, Beard, and Barrick (1984) found the same result in their study in a rural Ohio county. Fails (1989) concluded that part of the reason for the seemingly high interest in attending college among rural high school students was because of the stress put on the issue by the communities in which the high schools being studied were located.

One void that was left in the research described above was whether or not students from the apparently resource deficient rural high schools were able to meet admission standards for colleges as well as the students from urban schools. Raven (1990) researched this area in his study on the academic preparation of rural and non-rural students prior to enrollment in a college of agriculture. Raven (1990) found only slight differences in the numbers of urban, suburban, semi-rural, and rural students admitted to colleges of agriculture, but did report that urban students composed a higher percentage of students admitted unconditionally. However, Raven (1990) did report that there were a higher percentage of rural students admitted unconditionally than either suburban or semi-rural students.

While the studies on residential location and location of high schools did little to reveal the relationship between learning style and residential location or any other domestic or geographic variable, the studies were significant in revealing information about the academic achievement of high school students with relevance to residential location. Subsequently, academic performance, as indicated earlier, has been shown to have a relationship with learning style.
Therefore, the doors have been opened to studies on the relationships, if any, between learning style and residential location.

Summary of Chapter 2

As stated earlier by Guild and Garger (1985), and indicated through the literature, learning styles are an important concept in education. There are four particular dimensions of learning styles that all reflect on the individual student. However, one particular dimension – personality – with its field dependence/independence paradigm has surfaced as a most useful aspect of the learning styles concept in recent studies.

As indicated by Claxton and Murrell (1987), one must recognize that despite the clearly defined groups, the world is not made up of just two types of people (field dependent and field independent), but an individual is compared in this dimension of personality to the mean of the population. In addition, one must realize that one learning style is not superior to another (Witkin, Moore, Goodenough, & Cox, 1977), with both styles remaining independent of intelligence (Garger & Guild, 1984).

Although research has indicated that learning style was independent of intelligence, several studies have shown relationships between learning style and other characteristics. Through research, relationships, whether significant or not, have been established between learning style and age, gender, and cumulative grade point average. While other demographical variables have been studied on the same groups of people that the learning style studies researched, there have
not been any studies directly focusing on learning style and characteristics such as residential location.
CHAPTER 3

METHODOLOGY

The purpose of the study was to describe the learning style and selected demographical characteristics of selected Ohio first-year Agricultural Education students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School. The study further sought to analyze the relationship between the learning style and selected demographical characteristics of the students. Chapter 3 discusses the research design, population and sample, instrumentation, data collection, and data analysis procedures and techniques utilized in the study.

Research Design

The study was descriptive and correlational in design. According to Ary, Jacobs, and Razavieh (1985), the purpose of descriptive research was to describe and interpret what existed with respect to conditions or relationships among desired characteristics. The study was thus designed to collect data concerning students’ learning style, as well as their demographical information, and to then interpret the relationships between learning style and the other variables. The conditions placed on the study were that first-year students in Agricultural Education classes at selected Ohio high schools would be utilized.
The Group Embedded Figures Test was the standardized test used for data collection. A data sheet was also used to collect and determine the students’ demographical information on the selected categories - age, cumulative grade point average, gender, and residential location.

Population and Sample

The population of this study was first-year Agricultural Education students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School during the 2001-2002 academic year (N=101). There were twenty-one (21), thirty-four (34), and forty-six (46) first-year students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. Usable data was collected from twenty ($n_1=20$) Bellevue High School students on October 18, 2001, fifteen ($n_2=15$) Genoa High School students on October 17, 2001, thirteen ($n_3=13$) Genoa High School students on October 18, 2001 ($n_2=28$), and forty-four ($n_4=44$) Oak Harbor High School students on October 17, 2001. A 95% response rate for the study was achieved. On October 17, there were three (3) first-year Agricultural Education students absent from Genoa High School, and two (2) from Oak Harbor High School. On October 18, there were no first-year Agricultural Education students absent from Genoa High School, and one (1) absent from Bellevue High School. Students absent on the days of data collection were considered non-respondents. Due to the data collection process established a priori, there were no attempts to obtain data from these non-respondents.
In order to control possible frame, sampling, and selection errors, data was collected from all first-year Agricultural Education students present on the date of data collection. Utilizing an instrument that was valid and reliable controlled measurement error.

**Instrumentation**

One (1) standardized test and one (1) data sheet were utilized for data collection. The Group Embedded Figures Test (GEFT), developed by Oltman, Raskin, and Witkin (1971) was used to determine the learning style of the students. The data sheet was used to determine the selected demographical characteristics of the students.

**Group Embedded Figures Test (GEFT)**

The GEFT was administered to all first-year students in Agricultural Education that were in attendance at Genoa High School on October 17 and 18, 2001; at Oak Harbor High School on October 17, 2001, and at Bellevue High School on October 18, 2001. The GEFT was administered following the guidelines provided in the instructional booklet, *Manual: Embedded Figures Test, Children’s Embedded Figures Test, Group Embedded Figures Test* (Witkin, Oltman, Raskin, & Karp, 1971).

The GEFT determined a student’s learning style, field dependent or field independent, by assessing their ability to locate eighteen (18) simple figures from within a more complex field. The GEFT contained three (3) sections, and the first
section was used mainly for practice. Containing seven (7) geometric figures, Section I was not used for scoring, and students were allowed two (2) minutes to complete Section I. Sections II and III each contained nine (9) geometric figures and the students were given five (5) minutes to complete each section.

The task in each of the three (3) sections was the same, to identify and trace previously seen simple geometric figures that were embedded within a more complex figure. An individual’s score on the test was simply the number of simple figures correctly identified from within the complex figures. Since only the second and third sections were used for scoring, students could score between zero (0) and eighteen (18). These scores were then used to determine the students’ learning style. The national mean score for the GEFT was 11.4, with students scoring below 11.4 identified as field dependent learners, and students scoring above 11.4 as field independent learners (Witkin, Oltman, Raskin, & Karp, 1971). Since partial scores were not possible on the GEFT for the current study, those scoring from zero (0) to eleven (11) were considered to be field dependent, and those scoring from twelve (12) to eighteen (18) were considered to be field independent.

The validity of the GEFT has been established by determining its relationship with its parent test, the Embedded Figures Test (EFT), as well as with the Body Adjustment Test (BAT), and the Rod and Frame Test (RFT). The correlation coefficients between the GEFT and the EFT are -.82 for men and -.63 for women, with the negative coefficients resulting from differences in scoring procedures (Witkin, Oltman, Raskin, & Karp, 1971). Substantial correlation
coefficients also existed between the GEFT and the BAT, .71 for males and .55 for females. Finally, the reported correlation coefficients between the GEFT and the RFT were -.39 and -.34 for males and females, respectively (Witkin, Oltman, Raskin, & Karp, 1971).

The reliability of the GEFT was determined by using a Spearman-Brown reliability coefficient, reported as .82 for males and females combined (Witkin, Oltman, Raskin, & Karp, 1971). The reliability of the GEFT compared favorably with the reliability of the EFT, which was reported as .82 for males and .79 for females (Witkin, Oltman, Raskin, & Karp, 1971).

**Information Sheet**

The data sheet (Appendix A) utilized in the data collection was designed by the researcher to gather the selected demographical information for the study as well as personal data. Data collected via the data sheet were gender, age, cumulative grade point average, and the setting of the individual's primary residence, defined as farm or non-farm. The data sheet contained the operational definition of a farm for the study to reinforce the accuracy of the students' submitted demographical information. The researcher further explained the definitions before the data sheets were collected. The remaining demographical characteristics - age, grade point average, and gender were all self reported on the data sheets.

The reason for collecting self reported information from the students in the study was because data was collected early in the school year from first-year
students in high school Agricultural Education. Because of this, up to date information was not available from official high school records. In addition, the students had not yet completed a full grade-reporting period; so cumulative grade point averages had not been officially established for most students in the study. Therefore, age, gender, and grade point average were all self reported, with students giving their own computation of their grade point average.

Since there was no method for testing the validity or reliability of the information collected on the data sheet, it can only be assumed that students reported the information accurately to the best of their knowledge. It was explained to the students why the data was being collected in this manner and how it would be utilized, and there were no indications that any students would submit false information. While this would seem to allow for accurate, reliable data concerning age and gender, the reporting of grade point averages was more subjective. Since students had not yet had a grade report, they could only give self computed grade point averages from their own knowledge of their grades.

**Data Collection**

Data for the study was collected from intact, first-year Agricultural Education classes at Bellevue High School, Genoa High School, and Oak Harbor High School. One standardized instrument, the Group Embedded Figures Test (GEFT), was administered to twenty (20) Bellevue High School students, thirty-one (31) Genoa High School students, and forty-four (44) Oak Harbor High
School students. Data collection was completed during regularly scheduled Agricultural Education classes at each school.

The researcher administered the test to each class during the class’s allotted time. The class periods were forty (40) minutes, eighty (80) minutes, and forty-two (42) minutes in length at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. Due to the block scheduling at Genoa High School, the first-year Agricultural Education students were split into two separate classes and each one met every other day, requiring two days of data collection at Genoa High School.

Each regularly scheduled class period at each high school was determined to be enough time to distribute and collect the data sheets, as well as administer the GEFT instrument. The GEFT required twenty (20) minutes for administration while the data sheet required approximately five (5) minutes. The data collection process was conducted in the same order, and within the same amount of time for each collection period at each school. Before either instrument was administered, the researcher gave a brief introduction of the study, lasting no more that five (5) minutes. As soon as all instruments had been collected from the students, the remaining class time was turned back over to the class instructor for continuation of instruction.

During the brief introduction of the study, students were told what learning style meant, how it would be assessed, and the operational definition of farm was explained for easier understanding of the data sheet. In addition, students were assured of the confidentiality of the results of the study. After the introduction,
the data sheets were distributed and re-collected upon completion. The GEFT was then administered according to instructions in the GEFT manual (Witkin, Oltman, Raskin, & Karp, 1971). Per the guidelines in the manual, students were given a brief introduction to the study and the GEFT and what it was attempting to measure. Upon receiving the GEFT, students were given approximately two (2) minutes to read the instructions and fill out the information on the cover of the booklet. Students were then given two (2) minutes to complete Section I, which was the practice section. At the call for the end of the two (2) minutes, students were asked to put their pencils down and close their booklets so that no further work was done. Students were then given five (5) minutes to complete Section II, with the same ending procedure. Finally, students were given five (5) minutes to complete Section III, at which time the booklets were collected and the data collection period was concluded.

**Data Analysis**

The raw scores from the GEFT and the selected demographical characteristics were entered into SPSS/PC+ (Statistical Package for the Social Sciences, Personal Computer) version 10.0 for Windows for the application of statistical analysis procedures. Both descriptive and inferential statistics were utilized in analyzing the data.
Group Embedded Figures Test (GEFT)

Individuals were required to respond to eighteen (18) scoreable items on the GEFT. The GEFT tests were hand scored by the researcher, with the number determined to be correct entered as the raw score for each individual. The range of scores possible on the GEFT was from zero (0) to eighteen (18).

Selected Demographical Characteristics

The selected demographical information was self-reported by individuals in the study on the data sheet. Students had to select from farm or non-farm for residential location, and, in addition, students had to self report their age, gender, and grade point average. Only one choice could be marked for residential location and gender, and if more than one selection was marked, or there was unclear distinction as to which selection was made, that data, as well as that individuals GEFT score were considered unusable data. The students’ ages and grade point averages were hand written on the data sheet by the students, so if the reported information could not be read by the researcher, then that information as well as the students GEFT score were considered unusable data. However, there was no unusable data collected in the current study. The ages were entered as ratio data with no decimals. The grade point averages were entered as ratio data with two decimals. For data entry, the following values were used for the nominal categories:

<table>
<thead>
<tr>
<th>Residential Location</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = farm</td>
<td>0 = male</td>
</tr>
<tr>
<td>1 = non-farm</td>
<td>1 = female</td>
</tr>
</tbody>
</table>
Research Objective Analysis

This section explains the statistical procedures utilized to fulfill and analyze data for each of the research questions.

1. What were the ages, genders, grade point averages, and residential locations – farm or non-farm – of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School?

   Frequency, percentage, mean, minimum/maximum, and standard deviation were utilized to describe students’ ages and cumulative grade point averages. Frequency and percentage were used to describe students’ gender and residential locations.

2. What was the learning style of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School as determined by the Group Embedded Figures Test (GEFT)?

   Frequency, percentage, mean, minimum/maximum and standard deviation were utilized to describe the students learning style scores.

3. What was the relationship between learning style and selected demographical characteristics – age, gender, grade point average, and residential location - of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School?
Independent samples t-tests were used to describe the relationship between students' learning style and their gender and residential location.

Pearson product-moment correlation coefficients were used to describe the relationship between students' learning style and their age and grade point average. Davis' (1971) conventions were utilized to interpret the strength of relationships reported in the study (Figure 3.1). An alpha level of .05 was set for the study a priori.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.70 or greater</td>
<td>Very strong relationship</td>
</tr>
<tr>
<td>.50 to .69</td>
<td>Substantial relationship</td>
</tr>
<tr>
<td>.30 to .49</td>
<td>Moderate relationship</td>
</tr>
<tr>
<td>.10 to .29</td>
<td>Low relationship</td>
</tr>
<tr>
<td>.01 to .09</td>
<td>Negligible relationship</td>
</tr>
</tbody>
</table>

Figure 3.1: Davis' Correlation Descriptions (Davis, 1971)

Summary of Chapter 3

Chapter 3 contained descriptions and explanations of the research design, population and sample, instrumentation, data collection, and data analysis. The research design was descriptive and correlational. The population of the study was students enrolled in their first-year of Agricultural Education at Bellevue High
School, Genoa High School, and Oak Harbor High School during the 2001-2002 academic year (N= 101). The sample for the study was limited to those students present on the days of data collection, which yielded a usable sample for the study of 95 students (n= 95). One (1) standardized instrument, the Group Embedded Figures Test (GEFT), and one (1) data sheet were used for data collection. Data collection for the study was performed on intact Agricultural Education classes at Bellevue High School, Genoa High School, and Oak Harbor High School. In order to perform statistical operation, data was entered into SPSS/PC+, version 10.0 for Windows. Independent samples t-tests and Pearson’s correlation coefficients were used to determine relationships among variables, and Davis’ (1971) Correlation Descriptions were used to describe the relationships found.
CHAPTER 4

FINDINGS

The purpose of this study was to describe the learning style of students enrolled in their first-year of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School, and to determine the selected demographical characteristics of the same students. Further, this study sought to explore the relationship between learning style and the selected demographical characteristics. Chapter 4 contains the findings of the study.

The findings of the study were presented in order of the research questions for the study. The contents of chapter 4, therefore, include the following sections: 1) Selected Demographical Characteristics; 2) Students’ Learning Style, 3) Correlation Between Students’ GEFT Scores and Age, Gender, Cumulative Grade Point Average, and Residential Location.

Selected Demographical Characteristics

Data on selected demographical characteristics was collected from twenty (20), twenty-eight (28), and forty-four (44) first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. The selected demographical characteristics utilized for
data collection were age, gender, grade point average, and residential location. The following results show the findings of the selected demographical characteristics.

The data indicated that 46.3% (44) of the first-year students in high school Agricultural Education were fourteen (14) years old. Also, 36.8% (35) of the first-year students in high school Agricultural Education were fifteen (15) years old, while 14.7% (14) of the first-year students in high school Agricultural Education were sixteen (16) years old, and 2.1% (2) of the first-year students in high school Agricultural Education were seventeen (17) years old (Table 4.1). The mean age among all first-year students of high school Agricultural Education in the study was 14.73 with a standard deviation of .79. Furthermore, the data showed that 81.1% (77) of the first-year students in high school Agricultural Education were male, while 18.9% (18) were female (Table 4.2).

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>44</td>
<td>46.3</td>
</tr>
<tr>
<td>15</td>
<td>35</td>
<td>36.8</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>14.7</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean = 14.73
St. Deviation = .79

Table 4.1: Age of first-year high school Agricultural Education students (n=95)
<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>77</td>
<td>81.1</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>18.9</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Gender of first-year high school Agricultural Education students  
Table 4.2: (n=95)

Along with age and gender, cumulative grade point averages were self-reported on the data sheet by the first-year students in high school Agricultural Education. The students had a mean cumulative grade point average of 2.89, with a standard deviation of .67. Closer analysis of the self-reported grade point averages revealed that 0% (0) of first-year students in high school Agricultural Education had a cumulative grade point average of less than 1.0, 6.3% (6) students had a cumulative grade point average between 1.0 and 1.99, 44.2% (42) students had a cumulative grade point average between 2.0 and 2.99, 42.1% (40) students had a cumulative grade point average between 3.0 and 3.99, and 7.4% (7) had a cumulative grade point average of at least 4.0 (Table 4.3).
<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ .99</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.00-1.99</td>
<td>6</td>
<td>6.3</td>
</tr>
<tr>
<td>2.00-2.99</td>
<td>42</td>
<td>44.2</td>
</tr>
<tr>
<td>3.00-3.99</td>
<td>40</td>
<td>42.1</td>
</tr>
<tr>
<td>&gt; 4.00</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Mean = 2.89  
St. Deviation = .67

Table 4.3: Cumulative grade point averages of first-year high school Agricultural Education students (n= 95)

In order to collect data on the last selected demographical variable - residential location - students were given an operational definition of a farm on the data sheet and then asked to self-report whether or not they lived on a farm. The data sheets showed that 32.6% (31) of first-year students in high school Agricultural Education reported themselves as living on farms, while 67.4% (64) of the students reported themselves as living in non-farm residences (Table 4.4).

<table>
<thead>
<tr>
<th>Residential Location</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm</td>
<td>31</td>
<td>32.6</td>
</tr>
<tr>
<td>Non-farm</td>
<td>64</td>
<td>67.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 4.4: Residential location of first-year high school Agricultural Education students (n= 95)
Students’ Learning Style

The Group Embedded Figures Test (GEFT) was administered to twenty (20), twenty-eight (28), and forty-four (44) first-year students in high school Agricultural Education from Bellevue High School, Genoa High School, and Oak Harbor High School in order to assess learning style. Learning style was classified as being either field dependent or field independent, which was determined by the students’ individual scores on the GEFT. The national mean score for the GEFT was 11.4, and an individual was considered to be of field dependent learning style if they scored below 11.4 (Witkin, Oltman, Raskin, & Karp, 1971). Consequently, an individual was considered to be field independent if they scored above the national mean of 11.4. Since partial scores were not possible for this study, those students scoring eleven (11) or lower were classified as field dependent, and those scoring twelve (12) or higher were classified as field independent.

The ninety-five (95) first-year students of high school Agricultural Education in the study produced a mean GEFT score of 10.27 with a standard deviation of 5.35 (Table 4.5). A breakdown of the ninety-five (95) students revealed almost an even split between field dependent and field independent learners, with 49.5% (47) of the first-year students in high school Agricultural Education were field dependent, and 50.5% (48) of the students were field independent (Table 4.6).
<table>
<thead>
<tr>
<th>GEFT Score</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>6.3</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4.2</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>4.2</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>15</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>17</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean = 10.27  
Standard Deviation = 5.35

Table 4.5: Group Embedded Figures Test (GEFT) scores of first-year high school Agricultural Education students (n = 95)

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Dependent</td>
<td>47</td>
<td>49.5</td>
</tr>
<tr>
<td>Field Independent</td>
<td>48</td>
<td>50.5</td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.6: Learning Style of first-year high school Agricultural Education students (n = 95)
Difference Between Students’ Mean GEFT Scores
and Gender and Residential Location

Independent sample T-tests were used to determine the significance of the difference between first-year high school Agricultural Education students’ mean GEFT scores and gender and residential location.

The seventy-seven (77) male first-year students in high school Agricultural Education yielded a mean GEFT score of 10.13 with a standard deviation of 5.3, while the eighteen (18) females in the study yielded a mean GEFT score of 10.89 with a standard deviation of 5.68. The difference in these means was -.76, while the computed standard error for difference was 1.41. Thus, the t-statistic for comparison of mean GEFT scores between male and female first-year students in high school Agricultural Education was -.54 (Table 4.7). With a significance level of .05 set a priori, the independent samples t-test revealed that there was not a significant statistical difference in GEFT scores between the male and female first-year students in high school Agricultural Education.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10.13</td>
<td>5.3</td>
<td>-0.54</td>
<td>0.59</td>
</tr>
<tr>
<td>Female</td>
<td>10.89</td>
<td>5.68</td>
<td>-0.54</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Table 4.7: Independent Sample T-test Results - Comparison of GEFT Mean scores between male and female first-year high school Agricultural Education students (n= 95) (77 males, 18 females)
The thirty-one (31) first-year high school students in Agricultural Education identified by residential location as farm students yielded a mean GEFT score of 11.55 with a standard deviation of 5.41, while the sixty-four (64) students identified by residential location as non-farm students yielded a mean GEFT score of 9.66 with a standard deviation of 5.26. The difference in these means was 1.89, and the computed standard error for difference was 1.16. The t-statistic for comparison of mean GEFT scores between first-year students in high school Agricultural Education that live on farms and those that do not live on farms was 1.63 (Table 4.8). With the significance level of .05 set a priori, the independent samples t-test revealed that there was not a significant difference in GEFT scores between farm and non-farm first-year students in high school Agricultural Education.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm</td>
<td>11.55</td>
<td>5.41</td>
<td>1.63</td>
<td>0.107</td>
</tr>
<tr>
<td>Non-farm</td>
<td>9.66</td>
<td>5.26</td>
<td>1.63</td>
<td>0.107</td>
</tr>
</tbody>
</table>

Table 4.8: Independent Sample T-test Results - Comparison of GEFT Mean scores between farm and non-farm first-year high school Agricultural Education students (n= 95) (31 farm, 64 non-farm)
Correlation Between Students' GEFT Scores and Age, and Cumulative Grade Point Average

Pearson product-moment correlation coefficients (r) were calculated to describe the relationship between the GEFT scores and age and cumulative grade point average of first-year students in high school Agricultural Education. Correlations were based on the sample size of ninety-five (n=95), and Davis' (1971) conventions were used to interpret the scope of the relationship described.

A significant, positive, moderate relationship (r= .404) was found between the GEFT score and grade point average, but an insignificant, negative, negligible relationship (r= -.007) was found between GEFT score and age (Table 4.9).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEFT Score</td>
<td>.17 *</td>
<td>.404 *</td>
</tr>
</tbody>
</table>

*p<.05

Table 4.9: Relationship between GEFT score and age and cumulative grade point average of first-year high school students in Agricultural Education (n= 95)
Summary of Chapter 4

Chapter 4 contained the findings from the study and included both the results of the data collection on selected demographical characteristics and learning style of selected Ohio first-year students in high school Agricultural Education. The data showed that the mean age of first-year students in high school Agricultural Education was 14.73 and that 81.1% of first-year students in high school Agricultural Education were male. The data also showed that the mean cumulative grade point average of first-year students in high school Agricultural Education was 2.89, and that 32.6% of first-year students in high school Agricultural Education resided on farms. The results from the GEFT showed that the mean score among first-year students in high school Agricultural Education was 10.89. Further analysis of the data showed that there was no significant statistical difference in mean GEFT scores between males and females, or between farm and non-farm students. In addition, analysis of the data showed no significant relationship between GEFT score and age, but a positive, moderate relationship between GEFT score and cumulative grade point average.
CHAPTER 5
SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

Purpose of the Study

The purpose of this study was to describe the learning style of selected Ohio students enrolled in their first-year of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School, and to determine the selected demographical characteristics of the same students. Further, this study sought to explore the relationship between learning style and the selected demographical characteristics.

Research Questions

This study was guided by the following research questions:

1. What were the ages, genders, grade point averages, and residential locations – farm or non-farm – of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School?

2. What was the learning style of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak
3. Harbor High School as determined by the Group Embedded Figures Test (GEFT)?

4. What was the relationship between the learning style and selected demographical characteristics – age, gender, grade point average, and residential location - of first-year students of Agricultural Education at Bellevue High School, Genoa High School, and Oak Harbor High School?

**Research Design**

The study was descriptive and correlational in design. According to Ary, Jacobs, and Razavieh (1985), the purpose of descriptive research was to describe and interpret what existed with respect to conditions or relationships among desired characteristics. The study was thus designed to collect data concerning students’ learning style, as well as their demographical information, and to then interpret the relationships between learning style and the other variables. The conditions placed on the study were that first-year students in Agricultural Education classes at selected Ohio high schools would be utilized. The Group Embedded Figures Test was the standardized test used for data collection. A data sheet was also used to collect and determine the students’ demographical information on the selected categories - age, cumulative grade point average, gender, and residential location.
Population and Sample

The population of this study was first-year Agricultural Education students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School during the 2001-2002 academic year (N=101). There were twenty-one (21), thirty-four (34), and forty-six (46) first-year students enrolled at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. Usable data was collected from twenty (n=20) Bellevue High School students on October 18, 2001, fifteen (15) Genoa High School students on October 17, 2001, thirteen (13) Genoa High School students on October 18, 2001 (n=28), and forty-four (n=44) Oak Harbor High School students on October 17, 2001. A 95% response rate for the study was achieved. On October 17, there were three (3) first-year Agricultural Education students absent from Genoa High School, and two (2) from Oak Harbor High School. On October 18, there were no first-year Agricultural Education students absent from Genoa High School, and one (1) absent from Bellevue High School. Students absent on the days of data collection were considered non-respondents. Due to the data collection process established a priori, there were no attempts to obtain data from these non-respondents.

Instrumentation and Data Collection

One (1) standardized test and one (1) data sheet were utilized for data collection. The Group Embedded Figures Test (GEFT), developed by Oltman, Raskin, and Witkin (1971) was used to determine the learning style of the
students. The data sheet was used to determine the selected demographic of the students.

Data for the study was collected from intact, first-year Agricultural Education classes at Bellevue High School, Genoa High School, and Oak Harbor High School. One standardized instrument, the Group Embedded Figures Test (GEFT), was administered to twenty (20) Bellevue High School students, thirty-one (31) Genoa High School students, and forty-four (44) Oak Harbor High School students. Data collection was completed during regularly scheduled Agricultural Education classes at each school. The researcher administered the test to each class during the class’s allotted time. The class periods were forty (40) minutes, eighty (80) minutes, and forty-two (42) minutes in length at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. Due to the block scheduling at Genoa High School, the first-year Agricultural Education students were split into two separate classes and each one met every other day, requiring two (2) days of data collection at Genoa High School.

Each regularly scheduled class period at each high school was determined to be enough time to distribute and collect the data sheets, as well as administer the GEFT instrument. The GEFT required twenty (20) minutes for administration while the data sheet required approximately five (5) minutes. The data collection process was conducted in the same order, and within the same amount of time for each collection period at each school. Before either instrument was administered, the researcher gave a brief introduction of the
study, lasting no more that five (5) minutes. As soon as all instruments had been collected from the students, the remaining class time was turned over to the class instructor for continuation of instruction.

Data Analysis

The raw scores from the GEFT and the selected demographical characteristics were entered into SPSS/PC+ (Statistical Package for the Social Sciences, Personal Computer) version 10.0 for Windows for the application of statistical analysis procedures. Both descriptive and inferential statistics were utilized in analyzing the data. Frequency distributions, percentages, and mean were utilized to address the research questions for the study. Also, independent samples t-tests were utilized to compare the means and describe the relationships between the GEFT scores and gender and residential location. Finally, Pearson product-moment correlation coefficients were used to describe the relationships between GEFT scores and age and cumulative grade point average. Davis’ (1971) conventions for correlations were used to describe the strength of the relationships. An alpha level of .05 was set for the study a priori.

Summary of Findings

Selected Demographical Characteristics

Data on selected demographical characteristics was collected from twenty (20), twenty-eight (28), and forty-four (44) first-year students of Agricultural
Education at Bellevue High School, Genoa High School, and Oak Harbor High School, respectively. The selected demographical characteristics utilized for data collection were age, gender, grade point average, and residential location. The following results show the findings of the selected demographical characteristics.

The data indicated that 46.3% (44) of the first-year students in high school Agricultural Education were fourteen (14) years old. Also, 36.8% (35) of the first-year students in high school Agricultural Education were fifteen (15) years old, while 14.7% (14) of the first-year students in high school Agricultural Education were sixteen (16) years old, and 2.1% (2) of the first-year students in high school Agricultural Education were seventeen (17) years old. The mean age among all first-year students of high school Agricultural Education in the study was 14.73 with a standard deviation of .79. Furthermore, the data showed that 81.1% (77) of the first-year students in high school Agricultural Education were male, while 18.9% (18) were female.

Along with age and gender, cumulative grade point averages were self-reported on the data sheet by the first-year students in high school Agricultural Education. The students had a mean cumulative grade point average of 2.89, with a standard deviation of .67. Closer analysis of the self-reported grade point averages revealed that 0% (0) of first-year students in high school Agricultural Education had a cumulative grade point average of less than 1.0, 6.3% (6) students had a cumulative grade point average between 1.0 and 1.99, 44.2% (42) students had a cumulative grade point average between 2.0 and 2.99,
42.1% (40) students had a cumulative grade point average between 3.0 and 3.99, and 7.4% (7) had a cumulative grade point average of at least 4.0.

In order to collect data on the last selected demographical variable - residential location - students were given an operational definition of a farm on the data sheet and then asked to self-report whether they lived on a farm or not. The data sheets showed that 32.6% (31) of first-year students in high school Agricultural Education reported themselves as living on farms, while 67.4% (64) of the students reported themselves as living in non-farm residences.

**Students’ Learning Style**

The Group Embedded Figures Test (GEFT) was administered to twenty (20), twenty-eight (28), and forty-four (44) first-year students in high school Agricultural Education from Bellevue High School, Genoa High School, and Oak Harbor High School in order to assess their learning style. Learning style was classified as being either field dependent or field independent, which was determined by the students’ individual scores on the GEFT. The national mean score for the GEFT was 11.4, and an individual was considered to be of field dependent learning style if they scored below 11.4 (Witkin, Oltman, Raskin, & Karp, 1971). Consequently, an individual was considered to be field independent if they scored above the national mean of 11.4. Since partial scores were not possible for this study, those students scoring eleven (11) or lower were classified as field dependent, and those scoring twelve (12) or higher were classified as field independent. The 95 first-year students of high school
Agricultural Education in the study produced a mean GEFT score of 10.27 with a standard deviation of 5.35. A breakdown of the 95 students revealed almost an even split between field dependent and field independent learners, with 49.5% (47) of the first-year students in high school Agricultural Education were field dependent, and 50.5% (48) of the students were field independent.

**Difference Between Students’ Mean GEFT Scores and Gender and Residential Location**

Independent sample t-tests were used to determine the significance of the relationship between first-year high school Agricultural Education students’ GEFT scores and gender and residential location.

The seventy-seven (77) male first-year students in high school Agricultural Education yielded a mean GEFT score of 10.13 with a standard deviation of 5.3, while the eighteen (18) females in the study yielded a mean GEFT score of 10.89 with a standard deviation of 5.68. The difference in these means was -.76, while the computed standard error for difference was 1.41. Thus, the t-statistic for comparison of mean GEFT scores between male and female first-year students in high school Agricultural Education was -.54. With a significance level of .05 set *a priori*, the independent samples t-test revealed that there was not a significant statistical difference in GEFT scores between the male and female first-year students in high school Agricultural Education.

The thirty-one (31) first-year high school students in Agricultural Education identified by residential location as farm students yielded a mean GEFT score of
11.55 with a standard deviation of 5.41, while the sixty-four (64) students identified by residential location as non-farm students yielded a mean GEFT score of 9.66 with a standard deviation of 5.26. The difference in these means was 1.89, and the computed standard error for difference was 1.16. The t-statistic for comparison of mean GEFT scores between first-year students in high school Agricultural Education that live on farms and those that do not live on farms was 1.63. With the significance level of .05 set a priori, the independent sample T-test revealed that there was not a significant difference in GEFT scores between farm and non-farm first-year students in high school Agricultural Education.

**Correlation Between Students’ GEFT Score and Age and Cumulative Grade Point Average**

Pearson product-moment correlation coefficients (r) were calculated to describe the relationship between the GEFT scores and age and cumulative grade point average of first-year students in high school Agricultural Education. Correlations were based on the sample size of ninety-five (n=95), and Davis’ (1971) conventions were used to interpret the scope of the relationship described.

A significant, positive, moderate relationship (r= .404) was found between the GEFT score and grade point average, but an insignificant, negative, negligible relationship (r= -.007) was found between GEFT score and age.
Conclusions

Based on the analysis and interpretation of the findings of the study, the following conclusions, organized in accordance with the research questions, have been drawn.

Selected Demographical Characteristics

1. A large majority (81.1%) of the sample of students in the study was male.

2. A large majority (67.4%) of the sample of students in the study resided on non-farm residences.

3. Given that there were seventeen (17) year old students found to be enrolled in their first-year of high school Agricultural Education, it was concluded that not all first-year students of high school Agricultural Education were freshmen.

Students’ Learning Style

4. First-year high school students in Agricultural Education were almost evenly split between field dependent and field independent learning styles.
Relationship Between Learning Style and Selected Demographical Characteristics

5. Despite the sizeable difference in mean GEFT scores of farm and non-farm students, there was not a significant statistical difference between the two means.

6. Cumulative grade point average was positively correlated to first-year high school Agricultural Education students’ GEFT scores.

Implications

Based on the findings and conclusion of the study, the following implications have been developed.

Selected Demographical Characteristics

1. Based on the conclusion that a majority of first-year students in Agricultural Education (67.4%) were non-farm residents, it may be implied that there is an interest in agriculture or related topics and fields of study by the non-farming sector of society between the ages of fourteen (14) and seventeen (17).

Students’ Learning Style

2. The national mean GEFT score was 11.4 (Witkin, Moore, Goodenough, Friedman, Owen, & Raskin, 1977). Those individuals
scoring below the national mean were said to be field dependent while those scoring above the national mean were said to be field independent. The mean score for first-year students in high school Agricultural Education was 10.27, implying that, as a whole, first-year students in high school Agricultural Education tend to be field dependent. However, 49.5% (47) of the first-year students in high school Agricultural Education scored below the national mean score of 11.4, thus exhibiting a field dependent learning style while 50.5% (48) students scored above the national mean of 11.4, thus exhibiting a field independent learning style. These figures could be interpreted differently than the mean score to imply that first-year students of high school Agricultural Education did not prefer either type of learning style as a whole. But, since the mean score takes into account the actual scores and not just a categorization of the scores, and since there may be several scores significantly higher or lower than the national mean, it is still a valid implication that first-year students in high school Agricultural Education tend to be field dependent.

**Relationship Between Learning Style and Selected Demographical Characteristics**

3. The data analysis showed a mean score on the GEFT by first-year students in high school Agricultural Education that resided on farms of
11.55, while it showed a mean score of 9.66 for students that did not reside on farms. It was concluded that there was no significant statistical difference between these two mean scores, implying that the difference was a result of chance and that residential location, defined as farm or non-farm, was not a significant factor in determining students’ learning style.

4. Witkin et al. (1977) reported that there was not a significant relationship between GEFT scores and cumulative grade point average. However, a conclusion was drawn from the current study that there was a significant relationship between the cumulative grade point averages and GEFT scores of first-year students in high school Agricultural Education. The data analysis showed this to be a positive, moderate relationship, implying that, as students’ cumulative grade point averages rise, their GEFT score rises. This further implies that the higher a student’s cumulative grade point average, the higher their likelihood of being field independent.

5. The data analysis showed a mean score on the GEFT by female first-year students in high school Agricultural Education of 10.89, while it showed a mean score for male students of 10.13. Further analysis showed that there was no significant statistical difference in the mean scores of these two groups, implying that learning style is not significantly influenced by gender among 14-17 year old students in their first-year of high school Agricultural Education.
6. The finding that age is not significantly related to students' scores on the GEFT implied that between the ages of fourteen (14) and seventeen (17), GEFT scores, and thus learning style were not significantly influenced by age of the students.

**Recommendations**

**Recommendations for Instruction and Learning**

1. Instructors of first-year Agricultural Education classes at Bellevue High School, Genoa High School, Oak Harbor High School, and all other high schools should seek further knowledge of learning style, and consider learning style preferences among their students when planning and administering instruction.

2. Students in their first-year of Agricultural Education at Bellevue High School, Genoa High School, Oak Harbor High School, and all other high schools should be made aware of their learning style, and both the variables that influence learning style and the variables that learning style influences. Students should be taught about the differences in learning style and special attention should be given to those that need assistance in dealing with those differences.

3. The mean score of first-year students in high school Agricultural Education indicated a tendency towards field dependence, and there exists a significant, positive relationship between learning style and
cumulative grade point average. Therefore, first-year students in Agricultural Education at Bellevue High School, Genoa High School, Oak Harbor High School, and all other high schools should be taught study skills and methods of effective learning to increase their chances of effectively learning subject material and improving their academic performance.

4. Instructors of first-year Agricultural Education at Bellevue High School, Genoa High School, Oak Harbor High School, and all other high schools should be made aware of and understand their own learning style. Guild and Gager (1985), reported that teachers could reduce frustration for themselves and for their students by taking the time to gain an understanding of learning style and utilizing that knowledge.

**Recommendations for Further Research**

1. The current study should be replicated in more high schools throughout the state of Ohio.

2. The current study should be replicated with all classes of high school Agricultural Education, so that the data will encompass more students of similar ages and so the differences between grade levels can be studied.

3. The current study should be replicated with students in general education classes, along with Agricultural Education classes, since all students residing on farms may not be enrolled in Agricultural
Education. Further, this would allow for differences between Agricultural Education classes and general education classes to be studied.

4. The current study should be replicated with more classifications of residential location, such as urban, suburban, and rural, along with farm.

5. The current study should be replicated with more selected demographical characteristics, such as career preferences, plans after high school, and the number and relationship of all family members in the students' residence.

6. Research should investigate if students who are taught in regard to their preferred learning style have greater academic performance than those students who are not taught in regard to their preferred learning style (Torres, 1993, Starkey, 2000).

7. The current study should be replicated at a time when the selected demographical characteristics can be obtained from official documents and records, rather than being self reported.
APPENDIX A
INFORMATION SHEET

NAME_____________________________________ AGE_____

GENDER  M  F  CUMULATIVE GPA_____

Please read the following paragraphs, which explain the definition of a farm, as it will be used in this study. Then answer the questions that follow.

An individual is said to be in the business of farming if they cultivate, operate, or manage a farm for profit, either as owner or tenant. An individual is not in the business of farming if they operate a farm for recreation or pleasure rather than for profit. Activities or commodities which may be included in the operation of a farm are livestock, dairy, poultry, fish, fruit, forage, grain, vegetables, timber, and trucking (Farmer’s Tax Guide, 2000).

An individual’s residence is considered a farm if the property on which the residence was established is located outside of any corporation limits, the student or a family member is directly involved in a farming activity, as described above, and the student or family had at least $1,000 in receipts from that farming activity annually (Farmer’s Tax Guide, 2000).

Do you live on a farm?  Yes  No

If you answered yes to the previous question, please briefly describe the size and type of farming operation that you or your family is involved in.
References


McCracken, J.D., Beard, E.M., & Barrick, R.K. (1984). Agricultural background, experiences and plans of vocational agriculture students in Clark County, Ohio. Columbus: The Ohio State University, Department of Agricultural Education.


