Perceptions of the Influence of the Virginia Governor's School for Agriculture on VGSA Alumni

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Abstract

The Virginia Governor's School for Agriculture (VGSA) is a summer enrichment program for gifted and talented students from throughout the Commonwealth of Virginia. The program is sponsored by the Virginia Department of Education, and it takes place at Virginia Tech during the month of July each year. The program is housed in the Department of Agricultural and Extension Education in the College of Agriculture and Life Sciences. Students who participate in the program receive hands on, cutting edge instruction in the broad fields of agricultural sciences, natural resources, and veterinary medicine.

The nature of agriculture has and continues to evolve. Farmers comprise a very small portion of the population; however there are many careers in agriculture which require a steady supply of well-trained and highly educated professionals. It is projected that the demand for qualified college graduates to fill agricultural jobs will exceed supply. The VGSA has been developed as an agricultural literacy tool, to expose gifted and talented students to the diverse careers in the industry.

The purpose of this study was to examine the impact of the VGSA on the students who have completed the four classes. Specific objectives were to develop demographic information; to ascertain the perception of the influence of the VGSA on alumni choice of college, major, and career; and to ascertain the perception of the influence of the VGSA on alumni knowledge and perception of the agricultural industry.

A survey instrument was sent to all students who had completed the VGSA (N=316). Over half of the alumni (n=182) returned the instrument. No significant difference was found between early, late, and non-responders.

The findings show that the average VGSA student is a white female that resides in an urban area with a population greater than 20,000. This student has a high school GPA of 3.93 and is in the top 6% of her high school graduating class. She has an SAT math score of 627 and an SAT verbal score of 630. She is not a member of the FFA or 4-H.

The findings show that the VGSA does not have an overwhelming influence on alumni choice of college or college major. The VGSA does not have an overwhelming influence on alumni career goals. The findings show that the VGSA does have much influence on alumni knowledge and perception of the agricultural industry.

Dedication

This is dedicated to all of the students who I have taught or coached in the past, present, and future. It is you that make this the wonderful profession that it is.

I would also like to dedicate this to two wonderful people that are no longer with us, my Grandpa and Grandma Calloway. Your love of education and service is the greatest gift that you gave to your children and grandchildren.

Finally, I would like to dedicate this to my family. To my father Charles, mother Joyce, brother Jerry, sister Karen, brother-in-law Jon, sister-in-law Macey, niece Rebecca, and nephews Eric, Cole, and Carson; thanks for your love and support as I have treaded the adventuresome avenue of life.

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Chapter 1

Introduction

Over six billion people, who need over 18 billion meals each day, inhabit the earth, and the population is growing each and every day (U.S. Census Bureau, n.d.b). The industry of agriculture faces the challenge to feed all of these people. As the population has grown, the number of those who produce our food has decreased. The number of farmers in the United States represents approximately 2% of the population (U.S. Census Bureau, n.d.a). In 1930, there were 6.3 million farms in the United States (National Research Council, 1988). Today, there are 2.13 million farms in this country (American Farm Bureau Federation, 2004). Advances in technology have led to increase agricultural production on the farm, and these farms are more efficient than ever (Shelley-Tolbert, Conroy, & Dailey, 2000).

Agriculture is an industry which has become technologically advanced and increasingly complex. Because of this, the industry requires fewer people involved in production. However, a steady supply of well-trained and highly-educated professionals to insure future success is needed (Betts & Newcomb, 1986; Edwards, Leising, & Parr, 2002). Many of the careers in agriculture require skills in science and math (Shelley-Tolbert, et al., 2000). Many careers are high paying and in profitable sectors of the agricultural industry such as food processing and agricultural finance (National Research Council, 1988). Because of the changes in the employment structure of the agricultural industry, there has been a need for employees with an increased level of education in math and technology (Shelley-Tolbert, et al., 2000). Students who have been identified as gifted and talented have the skills to meet the demands of the agricultural job market.

Unfortunately, many secondary agricultural education programs in Virginia do not provide a curriculum that adequately prepares or attracts gifted and talented students for future careers in the industry. Many gifted and talented students attend schools that do not have an agricultural education program. Because industry has the task of recruiting young people who include gifted and talented students, programs are necessary to increase literacy in agriculture and science. In Virginia, the Virginia Governor's School for Agriculture (VGSA) has been developed to meet this need. This program specifically targets gifted and talented students in order to increase their knowledge of agriculture and to increase the possibility that they might pursue a career in the industry.

Background of Study

Agricultural Education Background

Early agricultural education programs had an emphasis on science. In 1890, legislation in Alabama established Congressional district agricultural schools. These schools provided students with knowledge of scientific concepts in the context of agricultural applications (Hillison, 1996; Edwards, et al., 2002). However, after the passage of the Smith-Hughes Act, agricultural education at the secondary level was shifted from a science-based discipline to a vocational influence (Hillison, 1996). Students were prepared for specific vocations in production agriculture.

As technological advances in production agriculture have led to fewer farmers producing more, the curriculum in agricultural education programs was slow to reflect changes in the industry. The National Research Council (NRC), in its benchmark publication *Understanding Agriculture: New Directions for* Education, found "Much of the focus and content of many vocational agriculture programs is outdated. Vocational

agriculture programs are uneven in quality" (National Research Council, 1988, p. 3). The work of the NRC in the late 1980s provided the basis for change in agricultural education. It was a call to change the curriculum to reflect changes in the infrastructure of the agricultural industry. The students who were necessary because they would be the future scientists, lawyers, and entrepreneurs were not being attracted to traditional agricultural education programs.

In its study on the status of agricultural education, the National Research Council (1988) found that career exploration programs were a rare component in the public school system, and that agricultural education programs did not extend beyond vocational agriculture program offerings. It was also concluded that Americans in general and students specifically did not have a realistic view of agriculture. The council stated that students did not understand agriculture's scope and career possibilities. Furthermore, students did not have a sense of the scientific progress through the use of "sophisticated biological, chemical, and electronic technologies" (National Research Council, 1988, p. 22).

The council argued that, "Agriculture is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies" (National Research Council, 1988, p. 1). The Council believed that increasing agricultural literacy would increase the number of students who pursued an education and a career in agriculture. The following general recommendations were made:

1. The focus of agricultural education must change,
2. Beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture (National Research Council, 1988, p. 2).

Specific recommendations were made in regards to career education:

1. The unique needs and career prospects of students at each school in different regions should be considered when developing agricultural exploration programs.
2. Career exploration programs need to emphasize professional agricultural careers to a greater degree, showing the connection between college preparation and agricultural leadership, business, and scientific occupations (National Research Council, 1988, p. 24).

Additionally, the Council recommended: "Special applied science courses on agricultural topics should be available as optional elective courses for those students who wish to go beyond the traditional science course curriculum" (National Research Council, 1988, p. 15).

After the publication of the NRC report, numerous programs began to integrate agriculture and sciences. Through such courses as agriscience, biological applications in agriculture, and aquaculture, students enrolled in many agricultural education programs were receiving instruction that provided context and relevance to science (Conroy & Walker, 2000; Edwards, et al., 2002). As Budke (1991) noted, "Agriculture provides a marvelous vehicle for teaching genetics, photosynthesis, nutrition, pollution control, water quality, reproduction, food processing where real live examples can become part of the classroom for experimentation and observation" (p. 4). Changes were made in order to attract students with higher academic achievement into agricultural education programs. These students include those who have been classified as gifted and talented.

In several states, including Virginia, programs have been implemented to specifically target gifted and talented students. In Virginia, the VGSA has been developed to provide an integrated approach to agriculture and science. The VGSA seeks to increase student literacy in agriculture and science in order to prepare them for possible careers in the industry.

Background of Virginia Governor's Schools

The Virginia Summer Residential Governor's School for Agriculture is part of the Gifted Program housed in the Virginia Department of Education (VDOE). The program has its roots in the early 1960s. Virginia was a participant in the national Superior and Talented Student (STS) study in 1960 and 1961. The purpose of STS was to train one person in each participating state department of education with the tools to provide leadership for the improvement of gifted and talented education. In response to the STS; Woodrow Wilkerson, Virginia State Superintendent for Public Instruction, formed a steering committee whose focus was to address the significant problems in leadership for gifted education (Virginia Department of Education, n.d.a)

The committee concluded its work and reported to Wilkerson in 1962. Several recommendations were made in regards to the conceptualization of giftedness. The committee stated that a child with an intellectual measurement at least two standard deviations above the national norm possessed potential for giftedness. The group also recommended that focus needed to expand beyond secondary programs. The group was clear that the Virginia educational system should provide opportunities specifically for the gifted and talented. The committee said:

> We subscribe to the philosophy of educating all children according to the needs imposed by individual differences and according to the principles of our democratic society. It is our belief that equal educational opportunities do not always mean identical opportunities (VDOE, n.d.a).

This was the beginning of gifted and talented education in the State of Virginia.

In 1972, several events at the national level helped to shape gifted and talented education in Virginia. During that year, the Marland Report was released. This study made five findings that were recommended to the states:

1. Recognizing the presence of gifted students in the general education population;
2. Establishing the need and responsibility through state policy that prescribed providing services to gifted students;
3. Designating at least one full-time person assigned to the education of the gifted;
4. Establishing state-level funding for the education of the gifted; and
5. Establishing expectations for the preparation of personnel who work with gifted students (Marland, 1972).

These five recommendations became the objectives for state gifted and talented programs across the nation. A second event in 1972 that affected gifted and talented education was the availability of federal funds through the Special Projects Section of PL 93-380. This provided money to the states to promote education for the gifted (VDOE, n.d.a)

The year 1973 was a benchmark year for gifted and talented education in Virginia. In that year, Governor A. Linwood Holton established the first Virginia Governor's School Program. Three summer residential programs began that year, serving 400 students. Since 1973, the program has expanded to more than 40 sites, and it annually serves more than 7,500 students throughout the Commonwealth. The purpose of the Virginia Governor's School is to give gifted and talented students opportunities beyond those normally available in the students' home school division (VDOE, n.d.c).

Since the inception of the Virginia Governor's School program in 1973, funding has been provided by the Virginia General Assembly and local school divisions. The General Assembly allocates funding which covers a major portion of the tuition for each student in all programs. The remaining portion of a student's Governor's School tuition will be paid for by that student's school division (VDOE, n.d.c).

Three types of Governor's schools have evolved to provide opportunities for the gifted students in Virginia. Those types of schools are the Academic-Year Governor's Schools, the Summer Regional Governor's Schools, and the Summer Residential

Governor's Schools. There are currently 16 Academic-Year Governor's Schools in the Commonwealth of Virginia. The Academic-Year program allows students the opportunity for accelerated learning and exploration in such areas as arts, government, technology, mathematics, and science. Year-round schools are established by law as "joint-schools." They are managed by a regional governing board of representatives from the school boards of each participating school division (VDOE, n.d.c).

There are 20 Summer Regional Governor's Schools available for students in Virginia. Groups of school divisions typically administer this type of school in order to meet the needs of gifted and talented elementary and middle school students. Students have opportunities in the arts, sciences, and humanities (VDOE, n.d.c).

The third type of Governor's School is the Summer Residential program. The Virginia Governor's School for Agriculture (VGSA) is this type of program. Summer Residential Governor's Schools provide intensive opportunities and experiences in such areas as visual and performing arts; humanities; mathematics, science, and technology; medicine and life science; marine science; and engineering. The summer schools are the School for the Humanities at the University of Richmond; the School for the Visual and Performing Arts also at the University of Richmond; the School for Mathematics, Science, and Technology at Lynchburg College; the School for Agriculture at Virginia Tech; and the School for Life Sciences and Medicine at Virginia Commonwealth University. The Department of Education also provides a mentorship program in engineering and marine science at Christopher Newport University in Newport News. This program is conducted in collaboration with the National Aeronautics and Space Administration. Finally, the state also conducts Summer Residential Governor's Foreign Language Academies in Richmond (VDOE, n.d.c).

At each Summer Residential Governor's School, the participants live and study with gifted and talented students from throughout the Commonwealth of Virginia at one of the institutions previously mentioned. Curriculum and activities are designed to encourage students' interests and abilities (VDOE, n.d.c). The Summer Residential program is open to any Virginia gifted and talented student who is in the tenth or eleventh grade. Each school division in the state is allotted a specific number of nominations. Students from public, private, and home schools who have been identified as gifted are eligible for nomination to the program (VDOE, n.d.c).

Virginia Governor's School for Agriculture

The first VGSA was held during the summer of 2001. That year, 52 students from throughout the Commonwealth participated in the inaugural school on the campus of Virginia Tech in Blacksburg. This school was conceived to enhance the agricultural literacy of the gifted and talented students from the State of Virginia (Duncan & Broyles, 2004). A feasibility study by the VDOE (1998) found a need to raise awareness and appreciation of the agricultural industry. Respondents to the survey believed that the agricultural industry needed high level skills and technologies, there were many career opportunities in agriculture, and there was a need to recruit diverse populations for employment (VDOE, 1998). Organizations such as the Virginia Farm Bureau and the Virginia Agribusiness Council perceived a Governor's School dedicated to agriculture as a tool to develop gifted and talented students' knowledge of the food and fiber system, a means of recruitment for students to study agricultural sciences in higher education, and a vehicle to motivate students to pursue careers in the industry (Virginia Farm Bureau, 2000). Through the efforts of industry groups and the support of Delegate Jay Katzen of

Warrenton, Virginia, the Virginia General Assembly adopted legislation creating funding for the VGSA. The Governor of Virginia, James Gilmore, signed the legislation into law in 1998.

After an application process, the VDOE approved Virginia Tech as the institution host for the VGSA. The Department of Agricultural and Extension Education in the College of Agriculture and Life Sciences (CALS) was chosen as the administrative body for the VGSA.

Virginia Tech has been the host institution for four VGSAs since its inception. Faculty and staff of the Department of Agricultural and Extension Education have developed the curriculum and activities for the four-week school which begins the first Sunday of July. The Department of Agricultural and Extension Education faculty and staff have a collaborative effort with other faculty members from the CALS, Natural Resources, Liberal Arts and Human Sciences, and the Virginia-Maryland College of Veterinary Medicine (Duncan & Broyles, 2004). Instructors for the VGSA are members of the faculty from the participating colleges and secondary agricultural instructors from throughout the state (Virginia Governor's School for Agriculture, 2004).

The mission of the VGSA is as follows:

> To provide hands-on, cutting-edge, scientific and academic instruction to future leaders and scientists in developing their understanding of the scope, opportunities, and challenges, through academic and scientific rigor of the broad fields of agriculture, human health, natural resources, and veterinary medicine. (VGSA, 2004, p. 3).

The school has the following goals:

- Provide educational programs designed to increase student knowledge of the infrastructure, scope, and implications of Virginia's largest industry, agriculture;

- Acquaint rising juniors and seniors with the professional and scientific education and career opportunities available to them in the agricultural, human health, natural resources, and veterinary medicine sectors;

- Provide structured educational programs in agriculture, natural resource management, veterinary medicine, environmental systems, and life sciences that will challenge these gifted and talented youth to study and research the scientific nature of agriculture and natural resources management as it relates to and affects environmental sustainability;
- Promote an atmosphere of inquiry and dialogue, with an appreciation for multicultural diversity; and
- Increase understanding of the complexities involved in providing safe, economical, and aesthetically pleasing food, fiber, and shelter (VGSA, 2004, p. 3).

Each student who attends the Governor's School for Agriculture is required to select a major. A student can select from six majors: agricultural economics, animal science, food science, natural resources, plant science, and veterinary medicine. Students are not guaranteed their first choice of major. The number of students for each major is limited, and students are placed in majors on a first come, first serve basis. All students will take a core course in each of the six fields of study. Each participant will take one specialized course in his or her selected major. Students also take a communication and presentation course. In this course, the students learn public speaking and professional presentation skills. Finally, students will take three elective classes that include such choices as global positioning systems, food safety, genetics, biotechnology, and leadership (Duncan & Broyles, 2004). These courses combine several teaching methods such as lecture, discussion, and laboratory.

Along with the classroom curriculum provided by the VGSA, students also participate in research projects. Each student is assigned to an Independent Group Project

(IGP) according to major. Three to four students belong to the cooperative work groups which are designed to provide "real-world" research. The IGPs are developed by each major under the supervision of university faculty, graduate students, and VGSA staff (VGSA, 2004b). The projects are designed to address real problems and applications related to agriculture in the state of Virginia. Projects from the 2004 school included *Expanding an Agricultural Entrepreneurship Through Agrimarketing and Agritourism*; *Sex Determination in Chicken Tissue Samples using PCR*; *Investigation of Edible Protein Films in Peanuts to Prevent Oxidation*; *Remotely Sensing the Future of Forest Sustainability*; and *Turfgrass Strength for Use on Athletic Fields*. Groups are required to produce a paper, professional poster, website, and brochure which present the results of their research projects. The groups also give a 10-15 minute oral presentation as part of the capstone symposium on the final Friday of the school (VGSA, 2004b). Since the beginning, several student project papers have been accepted for refereed publication.

Besides academic courses and projects, students also participate in other activities during the month that enhance their experience. These activities are unique to the VGSA, and provide breaks from the rigorous academic work. The students participate in a day long tour of agricultural companies in the State of Virginia. Tours have taken place at Rockbridge Winery in Raphine, Perdue in Bridgewater, and Saunders Farm in Nelson County. These tours are arranged through the Virginia Tech College of Agriculture and Life Sciences Alumni Organization. Students also take part in a college recruitment night sponsored by the Virginia Department of Education which is held at Lynchburg College. The staff provides numerous seminars that offer a variety of educational experiences. In 2004, Dr. James Robertson of Virginia Tech gave a lecture on the Civil War, and members of the CALS faculty presented a career forum. Students also participate in

extra-curricular activities such as softball, mountain hikes, and canoe trips (VGSA, 2004b).

Students apply for the Virginia Governor's School for Agriculture through their local school divisions. Home-schooled students apply through the school division that serves the geographic area in which they reside. Each school division selects nominees from student applicants and sends those on to the state level for further evaluation (Duncan & Broyles, 2004). As mentioned earlier, each school division has a certain number of nominees who can be submitted to the state. Applications are due to the local level in the late fall and to the state level in early winter. Personnel in the Department of Education make decisions on which students to extend invitations during February. The final roster of students is established by the middle of May, with the school beginning in the early part of July (VDOE, 2004).

Problem Statement

The industry of agriculture is changing and evolving into something that is much different from 100 or even 10 years ago. As mentioned earlier, the number of farmers has significantly declined to approximately 2% of the population; however, 20% of the population is employed in the agricultural industry in such positions as research and development, sales, and finance. Because of this, it is vital to attract a skilled workforce to meet the needs of the food and fiber system. Experts in the field of agriculture are vital to the well being and security of this country's way of life (Coulter, 1985). In order to successfully provide for the needs of this country and the world, agriculture needs an adequate level of scientific and professional capital (Coulter, 1985).

Because of changes in the industry, the agricultural education profession has also had to make changes. Agricultural education has had a positive effect upon students, parents, and communities. The dimensions of a secondary program are classroom instruction, supervised agricultural experience, laboratory instruction, and the FFA (Newcomb, McCracken, Warmbrod, & Whittington, 2004). For many years secondary programs have effectively prepared students for careers in the industry (Phipps & Osborne, 1988). Unfortunately, as the industry changed, agricultural education programs were slow to implement new curriculum in such areas as math and science that would attract gifted and talented students (National Research Council, 1988).

Experts, through such reports as that of the National Research Council in 1988, recommended systematic changes in order to change the nature of agricultural education. As mentioned earlier, the Council recommended, "The focus of agricultural education must change" (National Research Council, 1988, p. 2). It was then the task of the agricultural education profession and the agricultural industry to develop programs that provide students the opportunities in order to prepare them for different careers. These careers were highly skilled and required scientific and leadership training. Numerous programs have integrated science into the agricultural curriculum to meet the recommendations of the NRC and to help prepare students for the important and diverse careers in agriculture (Edwards, et al., 2002; Shelley-Tolbert, et al. 2000). The Virginia Governor's School for Agriculture is one of the programs which was conceived to address this problem.

Purpose of the Study

The purpose of the study was to examine the impact of the VGSA on the students who have completed the four classes.

Specific objectives are to:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni;
2. Determine the alumni perception of the influence of the Virginia Governor's School for Agriculture on participants' choice of institution for post-secondary education;
3. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' choice of major or field of study;
4. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' career goals; and
5. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' knowledge and perception of the agricultural industry.

Justification

Four classes of scholars have completed the VGSA program. As of this writing, no other follow-up study has been conducted to determine the impact of the VGSA on the students who have participated. This study is designed to measure the effect of the VGSA on those who have completed the month-long program.

The findings of this study will be useful to the stakeholders of the VGSA. Organizations such as the Virginia Farm Bureau and the Virginia Agribusiness Council can use the findings to demonstrate the effectiveness of the VGSA Program. This effectiveness includes the use of the program to increase agricultural literacy and career

awareness. Decisions concerning further support for this and similar programs can be made from the information generated by this study.

Institutions such as the VDOE and the College of Agriculture and Life Sciences at Virginia Tech can also use the findings as an evaluation tool for program effectiveness. The VDOE will have information that will help it to judge how effective the program is in adhering to its belief, "We subscribe to the philosophy of educating all children according to the needs imposed by individual differences and according to the principles of our democratic society" (VDOE, n.d.a), Virginia Tech provides faculty and facilities for the program. The University and College of Agriculture and Life Sciences can use the study to determine if the Governor's School for Agriculture meets the land grant mission and whether it is an effective tool for student recruitment.

The Virginia General Assembly and Virginia school divisions are also stakeholders, because these institutions provide funding for the program. Extending it beyond those institutions, the taxpayers of the state also are considered stakeholders. Taxpayers are stakeholders because they provide the dollars to the governmental bodies that provide services such as the VGSA. Governmental bodies throughout Virginia and the nation have experienced tight budgets due to slow economic times. Because of this, it is important that our representatives have evidence as to the effectiveness of programs that are being paid for with taxpayer dollars.

Gifted and talented students in Virginia and throughout the country can benefit from this study. There are many careers in the agricultural industry that are suited for gifted and talented students. This study will help to determine if programs like the VGSA

are appropriate tools to attract these types of students to colleges of agriculture and to careers in agriculture.

Limitations

The researcher recognizes that a limitation of the study is that conclusions from this study can only be inferred to students of the Commonwealth of Virginia who have completed the Virginia Governor's School for Agriculture program.

Definitions

Agriculture: The industry related to the production, processing, marketing, and development of food and fiber.

Agricultural literacy: The understanding of the food and fiber system which includes its historical, economic, social, and environmental significance to all Americans (National Research Council, 1988).

Agriscience: Identifying and using concepts of biological, chemical, and physical science in the teaching of agriculture, and using agricultural examples to relate these concepts to the student (Conroy & Walker, 2000, p.12)

Gifted and talented students: Students "whose abilities and potential for accomplishment are so outstanding that they require special educational programs to meet their educational needs" (VDOE, n.d.b, n.p.)

Land grant mission: The three components of teaching, research, and extension which serve as the primary functions of Land Grant Institutions as established by the Morrill Act of 1862 (Roberts, 2003).

Post-Secondary Education: Education beyond secondary school (Phipps & Osborne, 1988).

Secondary education: Education beyond elementary school, usually provided by a high school or college preparatory school (Phipps & Osborne, 1988).

Virginia Agribusiness Council: The organization that represents the Virginia agricultural and forestry industries' effective government relations and promotional efforts (Virginia Agribusiness Council, n.d.)

Virginia Farm Bureau: A membership organization in Virginia that advances the agricultural, economic, political, and social interests of county Farm Bureaus and their members (Virginia Farm Bureau, n.d.)

Virginia Governor's School Program: Special program for gifted and talented students sponsored by the Virginia Department of Education that was established by Governor Linwood Holton. There are three types of Governor's School programs: Academic All-Year, Summer Residential, and Summer Regional (VDOE, n.d. c, n.p.)

Virginia Summer Residential Governor's School Program: Virginia Governor's School program that provides "intensive educational experiences in visual and performing arts; humanities; mathematics, science, and technology; medicine and life science; or through mentorships in marine science or engineering" (VDOE, n.d.c, n.p.). This experience takes place during the summer, and students live for up to five weeks on a university or college campus in Virginia.

Virginia Governor's School for Agriculture: The summer residential Governor's School at Virginia Tech's Blacksburg campus that takes place from early July until early August. Students receive hands-on intensive instruction in agricultural science, human health, natural resources, and veterinary medicine.

Organization of the Study

Chapter 1 includes the introduction, background of the Virginia Governor's School for Agriculture, importance of the study, problem statement, purpose and objectives of the study, definition of terms, limitations of the study, and organization of the study.

Chapter 2 provides a review of the literature including perceptions of agriculture, programs for gifted and talented students, recruitment for careers in agriculture, and previous research studies of the Virginia Governor's School for Agriculture.

Chapter 3 provides a description of the methodology of the study. The chapter explains the design of the study, the sample and population, the instrument, methods and procedures used to collect data, and the methods and procedures used to analyze the data for this study.

Chapter 4 reports the data and findings, and Chapter 5 presents the summary, discussion, conclusions, implications, and recommendations generated from the findings.

Summary

The nature of careers in agriculture is changing and evolving. Agriculture is more than just production. The modern industry needs competent employees to fill much needed positions as scientist, marketers, communicators, and leaders. The skills taught in traditional vocational agricultural education programs no longer prepare students for the professional and highly skilled positions. Traditional vocational agricultural programs are not attracting the gifted and talented students necessary to meet employment demands of industry.

Leaders in industry and education over the last 15 to 20 years have called for a change in the nature of agricultural education. The changes are designed to prepare students with skills for careers in the diverse field of agriculture. In the State of Virginia, leaders from such organizations as the Farm Bureau and Agribusiness Council, along with leaders in the General Assembly, have helped to establish the Virginia Governor's School for Agriculture. This program has been developed as a tool to enhance the agricultural literacy of gifted and talented high school students in the state. The program provides exposure to the science and careers of the agricultural industry to not only students from traditional farming backgrounds but also those who are not enrolled in traditional agriculture programs or live in traditional agricultural settings. This research study will explain how the Virginia Governor's School for Agriculture has impacted students who have participated in it.

Chapter 2

Review of Literature

The purpose of this study was to determine the impact of the Virginia Governor's School for Agriculture (VGSA) on the students who have participated in it. This chapter will examine the literature that discusses the need for students to pursue education and careers in agriculture, student knowledge and perceptions of agriculture, the recruitment of gifted and talented students, and the integration of academic and vocational subject matter. This chapter will also examine the literature as it relates to an overview of gifted and talented education, specifically, a definition of gifted and talented; characteristics and needs of gifted and talented; curriculum delivery programs; and specific programs similar to the VGSA. The chapter will conclude with a discussion of the Pennsylvania Governor's School for Agricultural Sciences (PGSAS), and previous studies of the VGSA.

Career Recruitment

The agricultural industry is faced with the challenge of recruiting gifted and talented students to pursue careers in agriculture. As the NRC's (1988) findings on agricultural education pointed out in the late 1980s, "Neither students nor Americans in general have a realistic view of agriculture's scope, career possibilities, or involvement with scientific progress and the use of sophisticated biological, chemical, mechanical, and electronic technologies" (NRC, 1988, p.22). Nordstrom, et al. (1999) pointed out that only two percent of the population is involved in production agriculture. In the early 1980s, as many as 13% of the jobs in the food and fiber industry were not filled or were filled by under-qualified individuals (Mallory & Sommer, 1986). This trend has

continued through the 1990s and into this decade. Employment opportunities in the agricultural and natural resources sector are expected to remain strong over the next five years. It is expected that approximately 52,000 jobs will be available annually in agriculture between the years 2005 and 2010, with only 49,300 qualified college graduates available for these jobs (Goecker, Gilmore, Smith, & Smith, 2005).

As the nature of agricultural careers shifted away from production agriculture, enrollments in the colleges of agriculture declined while total enrollment in US colleges and universities increased in the late 1970s to early 1980s (Coulter, 1985). Enrollments in colleges of agriculture declined by as much as 25% in the late 1970s and early 1980s (Coulter, 1985). Coulter (1985) remarked, "Ironically, however, today when our universities are coping with a serious image problem in recruiting academically outstanding students, we are, at the same time witnessing in many respects the finest hour of achievement in the agricultural sciences" (p. 20). Coulter (1985), at that time, pointed out that the public held a narrow view of agriculture. The public equated agriculture with farming.

Students were not pursuing careers or enrolling in colleges of agriculture for various reasons. The farming sector of the agricultural industry experienced a severe recession in the late 1970s and early 1980s. Depressed prices drove family farms out of business. Coulter argued, "The media's exploitation of news about farmers in financial trouble contributes to a negative image which, by default we are allowing to be extended to the whole of agriculture and particularly to the food and agricultural sciences higher education system" (Coulter, 1985, p. 20). Hoover and Houser (1991) noted, "Several studies conducted in response to declining enrollments in colleges of agriculture indicate high school students' lack of general knowledge about agricultural careers, and they have

a poor image of agriculture" (p.14). Students were developing a negative perception, and because the number of students exposed to agriculture was falling, students were not developing the appropriate knowledge of the industry.

Russell (1993) argued that the lack of agricultural background and experience will lead to a "brain drain" in agriculture. This in turn will jeopardize the long-term future of the agricultural industry if the loss of individuals with training and experience were to continue (Russell, 1993).

Enrollments in colleges of agriculture rebounded in the late 1980s into the 1990s. The number of students enrolled increased by 30% over a seven-year period ending in 1996 (Weldon, Covington, Long, & Conner, 1999). During that same time period, colleges of agriculture experienced substantial increases in female and minority student enrollments (Weldon, et al., 1999). Recent reports show that the enrollment numbers of ten years ago have remained steady through this decade (Food and Agricultural Education Information System, 2004).

A high demand for college graduates with skills necessary for the agricultural industry is predicted for the years 2005 to 2010. The demand exceeds the anticipated supply of qualified graduates (Goecker, et al., 2005). Many of these positions depend upon advanced skills in such areas as science (Edwards, Leising, & Barr, 2002). Gifted and talented students comprise a population that could possibly be recruited to meet the demands of the agricultural employment market.

Perception and Knowledge

In order to recruit more students, specifically gifted and talented students, the agricultural industry needed to change the knowledge and perceptions of those who were

needed to fill important roles in the industry. Intentions to participate in an activity could be predicted based upon knowledge, observation, or other information about some issue (Fishbein & Ajzen, 1975). Dyer, Breja, and Andreasen (1999) argued that by analyzing one's beliefs about agriculture, a prediction can be made as to whether that person will pursue a college major or a career in the field. Students with a positive perception and a high degree of knowledge will be more likely to pursue a degree and career in agriculture.

Washington and Rodney's (1984) study of public school students from metropolitan areas in Ohio (N=1,591) presented evidence that minority students lacked information about agriculture and natural resources at the secondary school level. Their study further suggested that parents were the most influential in minority students' career decision process. They further argued that minority students tended to seek similar careers to their parents (Washington & Rodney, 1984).

Betts and Newcomb (1986) found that 85% of the Ohio school students in their study (N=186) had never considered attending a college of agriculture. The students who participated in this study had achieved a composite ACT score of 26 or above or had scored 1150 or above on the SAT. These students had also been admitted to The Ohio State University. They found that a vast majority of the students had no interest in agriculture as a career, and that many of them had never given thought to pursuing a career in this industry. The researchers concluded that students did not have an accurate knowledge about agriculture, and they had no interest in farming (Betts & Newcomb, 1986).

Mallory and Sommer (1986) found that California high school juniors and seniors (N=540) who participated in their study were not aware of the range of opportunities in

agricultural careers. Those students equated agriculture with farming. When choosing a career; the students identified a stable, secure future and income as the most important considerations. This study from the mid 1980s showed that students did not see agriculture as providing security and a high income. These researchers also reported that students received very little encouragement to pursue a degree in agriculture (Mallory & Sommer, 1986).

There has been a significant difference between the perceptions of students in colleges of agriculture compared to students in other colleges. In a 1985 study of Iowa State University freshmen from the College of Agriculture (N=417) and College of Sciences and Humanities (N=375), Carter and Liebold (1987) found a highly significant difference between those students enrolled in the College of Agriculture and the College of Sciences and Humanities with regard to attitudes toward agriculture. Students enrolled in the College of Agriculture were more optimistic about the future of agriculture and career opportunities in the industry than the students in the College of Sciences and Humanities. They also reported that students in the College of Sciences and Humanities were encouraged by their parents to enter an occupation other than farming at a higher rate than students in the College of Agriculture (Carter & Leibold, 1987).

University students have been found to have positive perceptions of agriculture. Terry and Lawver (1995) found students from Texas Tech University (N=400) perceived the food supply as safe, and that agriculture had a positive impact on the economy and environment. They also found that male students had more positive perceptions than females, and that students in the Law School and the College of Education had similar perceptions as those in the College of Agriculture. Students in other colleges differed from the College of Agriculture students (Terry & Lawver, 1995).

Students in the College of Communication Arts and Sciences at Michigan State University had a low level of knowledge concerning such areas as demand for agricultural products, the growth of U.S. agricultural exports, and the scope of international agriculture (Moore, Ingram, & Dhital, 1996). These authors also found that students in the College of Agriculture and Natural Resources also had low levels of knowledge as it related to international agriculture (Moore, et al, 1996).

Dyer, Breja, and Andreasen (1999) also studied attitudes of college students towards agriculture. They found that freshmen in the College of Agriculture at Iowa State University (N=513) "viewed the field of agriculture as both scientific and technical" (Dyer, et al., 1999, p. 4). The group of students studied believed that students from different backgrounds, not just farming, should pursue careers in the industry (Dyer, et al., 1999). Students who have exposure to agriculture through enrollment in high school agriculture, FFA, or 4-H were more likely to complete a four-year degree program in agriculture than students who have not had similar experiences (Dyer, et al., 1999).

Some have argued that the urbanization of the American population has lead to an inaccurate and low awareness about agriculture (Terry & Lawver, 1995). Frick, Birkenholz, Gardner, and Machtmes (1995) found that rural Indiana high school students (N=668) had significantly higher knowledge of agriculture than urban inner-city Michigan high school students (N=453). As related to specific areas of agriculture, rural students in the aforementioned study were most knowledgeable about natural resources and least knowledgeable about plant agriculture. Urban students were most knowledgeable about the area of natural resources, and they had the least knowledge about agricultural policy (Frick, et al, 1995).

White, Steward and Linhardt (1991) concluded that Kansas City inner-city students (N=280) had the perception that those who work in agriculture should have an agricultural background and work outdoors. They also found a belief among those inner city students that there are career opportunities available in many areas of agriculture, and these students believed that the greatest opportunities existed in engineering, education and extension, food service and lodging management, and horticulture (White, et al., 1991). Inner city students have been shown to have positive perceptions about agriculture and careers in the industry (White, et al, 1991; Frick, et al., 1995).

Research has shown that African-American students have little knowledge about careers in the area of agriculture and natural resources. Letherberry and Wellman (1988) found that African-American Virginia high school students (N=313) had little knowledge about careers in forestry and skills required for those positions. Urban African-American students have been found to lack an appropriate agricultural and natural resources background that would help them to make an immediate commitment to a career in those fields (Case, 1993).

One of the factors cited for students not studying or choosing a career in agriculture is the lack of encouragement from their parents (Mallory & Sommer, 1986; Carter & Leibold, 1987). Students are affected by the influence of their parents. Adults from rural areas have a higher level of knowledge and more positive perceptions of agriculture (Frick, Birkenholz, & Machtmes, 1995). Frick, Birkenholz, and Machtmes (1995) found adults from throughout the United States (N=886) who lived on farms were more knowledgeable about agriculture than rural non-farm and urban adults. These adults were the most knowledgeable about the animal concepts of agriculture and the least knowledgeable about plant concepts (Frick, et al., 1995). Frick's group (1995) also found

that adults with higher levels of education were more knowledgeable than those with less education.

4-H members who were enrolled in high school agricultural education programs have had the most positive perceptions and highest knowledge of agriculture (Duncan & Broyles, 2004; Frick, Birkenholz, & Machtmes, 1995). Duncan and Broyles (2004) found that students who were 4-H members in the 2003 VGSA (N=86) held a higher knowledge and had more positive perceptions of agriculture than students who were not 4-H members. With regards to specific areas of agriculture, Frick, et al. (1995) found that Midwestern 4-H members (N=864) were most knowledgeable about natural resources and marketing agricultural products. They were least knowledgeable about the area of plant agriculture. 4-H members held more positive perceptions of natural resources and animal sciences and the least positive perceptions about agricultural policy (Frick, et al., 1995).

Exposure to agriculture may lead to students holding higher perceptions of agriculture. In a study of Illinois high school students (N=1140) enrolled in Biological Science Applications in Agriculture (BSAA) and their parents (N=1140), it was found that students enrolled in BSAA held positive attitudes toward agriculture. Further, these students held positive attitudes toward careers in agriculture. Also, parents of these students held similar positive attitudes (Osborne & Dyer, 2000). The researchers found, "Both groups believe agriculture is a scientific field with numerous career opportunities" (Osborne & Dyer, 2000, p.58).

Recent research has shown that the knowledge of agricultural education students does not differ from general education students (Pense & Leising, 2004). Pense and Leising (2004) found that high school seniors in several Oklahoma (N=330) high schools

were not agriculturally literate. Students who attended rural schools had lower levels of agricultural knowledge than students at urban or suburban schools (Pense & Leising, 2004). These findings contradict Frick's conclusions about rural and urban students.

Students with positive perceptions and high levels of knowledge of agriculture will more likely choose the industry as a field of study and a long term career. Agricultural literacy is important in the quest to develop more positive levels of perception and provide students with high levels of knowledge.

Agricultural Literacy

In order for students to pursue college majors and careers in agriculture, they need to develop the appropriate perceptions and knowledge of the field. Students must receive meaningful education at an early age, so they will develop positive images of agriculture. It would benefit the industry to develop more highly agricultural literate students.

In response to the changing nature of agriculture, the secretaries of the departments of Agriculture and Education created a committee to look into the future of agricultural education. From this committee's work, the National Research Council (NRC) produced *Understanding Agriculture: New Directions for Education*. The conclusions of the NRC report provided recommendations for the future direction of agricultural education. As the chairman of the committee wrote, "The committee believes that a renewed commitment to and broadening of agricultural education will ensure the skills and knowledge essential to the future vitality of American agriculture" (National Research Council, 1988, p. vii). The Council further noted, "Achieving the goal of agricultural literacy will produce informed citizens able to participate in establishing the

policies that will support a competitive agricultural industry in this country and abroad" (NRC, 1988, p. 2).

Agricultural literacy is defined as education about agriculture. In comparison, traditional vocational agricultural programs provide education in agriculture (NRC, 1988). Vocational agricultural programs arose after the Smith-Hughes Act of 1917. These programs were created to prepare students for careers in agriculture (Birkenholz, 1992). The intent of agricultural literacy programs is to provide broad knowledge about the industry, not to prepare students for specific careers (NRC, 1988).

The leaders of the agricultural industry came to the conclusion that agriculture was too important to only be taught to the relatively small percentage of students enrolled in vocational agriculture (Birkenholz, 1992). The Agricultural Literacy Work Group in 1992 argued, "It is the prevention of unanticipated and ill-advised effects on agriculture that the agricultural literacy effort is directed toward" (Birkenholz, 1992, p. 4). It was urged that agricultural education be expanded beyond the scope of traditional vocational education (NRC, 1988).

The effort which began in the late 1980s to increase agricultural literacy had as its purpose "to produce more informed citizens who would be able to more fully participate in the establishment of polices which support a highly competitive agricultural industry in this country and abroad" (Birkenholz, 1992, p. 5). An agriculturally literate person was deemed to have an understanding of the food and fiber system that included its history, current economic importance, social impact, and environmental significance (Birkenholz, 1992). In addition, an agriculturally literate person also possesses an awareness and understanding of careers in agriculture (Birkenholz, 1992). It was argued that a college

graduate should not be viewed as "fully educated" if he or she lacks an awareness of the importance of agriculture and the role it plays in daily life (Birkenholz, 1992).

The Ag Literacy Working Group identified the following basic purposes of agricultural literacy programs:

1. To develop an understanding of ethical and environmental issues affecting agriculture;
2. To develop the ability to grow and care for plants and animals;
3. To develop an understanding of the relationship between agriculture and diet;
4. To develop an appreciation for agriculture's relationship to national and international economic and trade systems;
5. To develop an understanding of issues relating to agricultural policy of the federal government;
6. To develop an awareness of the broad diversity of agricultural careers (Birkneholz, 1992, p. 8).

A challenge went forth to develop new ways of delivering agricultural education in order to promote agricultural literacy. Agricultural literacy programs were charged to give special attention to urban areas and in particular minority and female students, who were seen as being under-represented in the industry (Birkenholz, 1992). Also, it was argued that agricultural literacy programs should be directed in unique and different ways to people in rural areas. Too often those in rural areas perceive agriculture from the farming perspective instead of a broad field of study (Birkenholz, 1992).

The NRC report listed the following as basic topics to a comprehensive agricultural education literacy program:

1. An understanding of the broad definition of agriculture.
2. How food and fiber originate.
3. How food and fiber are processed and distributed.
4. The global economics of food and fiber.
5. Food safety and quality issues (preservation, pests, pesticides, etc.).
6. Wise use and management of natural resources (water, soil, minerals, energy, the oceans).
7. Global climates issues (deforestation, water, soil, drought, etc.).
8. Global population issues related to food production and distribution.

9. Human and animal health and nutrition issues (diet, animal agriculture, etc.)
10. The application of science and business principles to agriculture.
11. Agriculture trade issues.
12. Geopolitical issues related to food.
13. Care for indoor and outdoor environments, including lawns, gardens, interior plantscapes, recreational areas, and parks. (Birkenholz, 1992, p. 12)

It was recommended that existing institutions should be used to deliver agricultural literacy programs. Such institutions as the United States Department of Agriculture, the Cooperative Extension Service, state departments of education (specifically departments other than career and technical education), and universities should be used to develop new agricultural literacy programs or incorporate agricultural literacy into existing programs (Birkenholz, 1992). The VGSA is a cooperative effort of the Virginia Department of Education and the College of Agriculture and Life Sciences at Virginia Tech. The program is a component of Virginia's Gifted Education Program.

The question must be asked as to the results of agricultural literacy programs. Numerous states have modernized agricultural curriculum. Programs have moved away from traditional production and vocational agriculture, and these programs have added curriculum in biological sciences, horticulture, and natural resources. Almost immediate results were realized by programs (Osborne & Dyer, 2000). Agricultural education numbers have increased even though the overall number of students in our nation's schools has decreased (Dyer, et al, 1999). In the 1990s secondary agricultural education enrollment began to recover from the late 1980s when enrollment was a little more than 500,000 students (Speer, 1998). Currently there are over 800,000 students enrolled in agricultural education across the country (National Council of Agricultural Education, n.d.).

The goal of the agricultural education profession in the recent past has been to develop more highly agricultural literate students. Students with higher levels of agricultural literacy would have the skills and knowledge necessary for the future of American agriculture. The VGSA is just one component of the overall agricultural literacy program.

Other Recruitment Strategies

The industry and profession moved to use agricultural literacy as a recruitment tool for careers in agriculture. The VGSA is being used as a recruitment tool for gifted and talented students. The desired outcome is to attract gifted and talented students to colleges of agriculture in order to prepare them for careers. Other strategies have been recommended in the literature to attract these students to higher education.

Betts and Newcomb (1986) recommended that colleges of agriculture convey the image that agriculture is a vital, up-to-date, diverse industry which offers a variety of career opportunities. High-ability urban students must be convinced that the agricultural industry has careers that pay well, are enjoyable, challenging, interesting, and have strong job markets that provide opportunities for advancement. These high-ability urban students should be given the information in order to convince them that an agricultural college can meet their needs for career preparation (Betts & Newcomb, 1986).

High-ability urban students in the Ohio study preferred campus visits and personalized recruitment strategies (Betts & Newcomb, 1986). Betts and Newcomb recommended that agricultural colleges invite high-ability urban students to the campus to participate in classes, see facilities, and meet with faculty and students (Betts & Newcomb, 1986). Gifted and talented students are on the Virginia Tech campus for four

weeks during the VGSA program. They take classes taught by faculty members of the College of Agriculture and Life Sciences, and the classes and research projects take place in some of the best classrooms and laboratory facilities at the university. As with the VGSA, students who participate in the Pennsylvania Governor's School for Agricultural Sciences have exposure similar to the Betts and Newcomb recommendation.

Mallory and Sommer (1986) suggested that summer apprenticeships in agricultural specialties should be continued and expanded. Students should be exposed to career opportunities and the study and work involved with these opportunities (Mallory & Sommer, 1986). Mallory and Sommer also argued that, "Specific outreach programs should be targeted to high schools with high minority enrollments" (Mallory & Sommer, 1986, p. 17).

Stadelman, Nelson, and Stadelman (1986) addressed the specific recruitment of gifted and talented students for the food science industry. They asked the question, "If academically capable secondary students are unaware of the opportunities within food science, how can they be recruited?"(Stadelman, Nelson, & Stadelman, 1986, p. 92,) Three needs for the food science industry were identified by Stadleman et al.:

1. Recruitment of high-quality students
2. Providing these students with high-quality graduate-level education that is pertinent to their profession
3. Placement of these graduates in positions that sufficiently challenge their research abilities. (Stadelman, et al., 1986).

Stadelman's group offered recommendations for the food science industry. They suggested that early awareness through career exploration programs be provided to gifted and talented students. They wrote, "Students who are qualified and motivated toward academic excellence are often looking beyond high school at an early age" (Stadelman, et al., 1986, p. 92). A specific finding was that summer residential programs on a university

campus were most effective and a meaningful tool in expanding student awareness (Stadelman, et al., 1986). They noted

> Having food science courses included in summer programs that challenge academically gifted high school students will increase awareness of food science as a career possibility . . . These contacts will, in the long run, result in greater numbers of highly qualified students applying to food science programs (Stadelman, et al, 1986, p. 94).

The VGSA provides exposure to the Virginia Tech College of Agriculture and Life Sciences in a challenging setting for gifted and talented high school students. Students are exposed to the diverse academic opportunities available at Virginia Tech and other Colleges of Agriculture.

Integration of Academic and Vocational Subject Matter

As mentioned throughout this study, the NRC (1988) in its benchmark report called for a change in the nature of agricultural education. The report pointed out, "Vocational agriculture programs must be upgraded to prepare students more effectively for the study of agriculture in post-secondary schools and colleges and for current and future career opportunities in agricultural sciences, agribusinesses, marketing, management, and food production and processing" (NRC, 1988, p. 4). The National Commission on Secondary Vocational Education (1984) argued, "What is really required today are programs and experiences that bridge the gap between the so called 'academic' and 'vocational' courses" (p. 14). It was recommended that agricultural education programs integrate academic and vocational subject matter (NRC, 1988).

Integrating academic subject matter with agriculture helps students to understand basic concepts such as science which these students need to understand in order to

complete high school (NRC, 1988). The integration of such subjects as science with agriculture provides a real world connection that traditional science curriculum is claimed to lack (Edwards, et al., 2002). Erickson (1995) argued that an integrated curriculum helps students to understand concepts through real-world applications.

Researchers have argued that integration which is a student-centered approach to learning may be the best way that students learn science (Edwards, et al, 2002; Von Secker & Lissitz, 1999). From their study of high school students who participated in the 1990 National Longitudinal Study, Von Secker and Lissitz (1999) found that instruction which emphasized laboratory instruction was associated with higher achievement. These researchers wrote, "De-emphasizing traditional teacher-centered instruction is expected to increase average science achievement and minimize gaps in achievement between individuals of different socio-economic status" (Von Secker & Lissitz, 1999, p. 1122).

Research in agricultural education has found that integration has been successful. An Illinois study by Roegge and Russell (1990), found students (N=104) from comprehensive production agricultural education programs held more positive attitudes toward the learning experience after completing an integrated course. The researchers argued, "The integrated approach is superior to the traditional approach in producing higher overall achievement and in producing higher applied biology achievement" (Roegge & Russell, 1990, p. 30).

Illinois has been a leader in the integration of science and agriculture. Courses such as Biological Science Applications in Agriculture (BSAA) and Physical Science Applications in Agriculture (PSAA) were introduced into the science and agriculture curriculums of Illinois beginning in the early 1990s (Osborne & Dyer, 2000). In the five year period between 1990 and 1995, Illinois experienced a 40% increase in student

enrollments in secondary agriculture education, which Osborne and Dyer (2000) attribute to the changes in the state curriculum.

Mabie and Baker (1996) found that fifth and sixth grade students from inner-city schools in Los Angeles (N=147) had positive impacts from science activities that were agricultural in nature. Students who had participated in experiential activities showed greater skills than students in the control group for this study (Mabie & Baker, 1996).

Findings from an Arkansas study in the late 1990s supported hands-on activities as a superior tool to reinforce physical science principles (Johnson, Wardlow, & Franklin, 1997). Students (N=132) who used hands on activities to learn physical science principles held significantly more positive attitudes towards science than students who used traditional worksheets (Johnson, et al., 1997). Even though student attitudes were more positive toward science after exposure to hands-on activities, the researchers warned that student achievement was not significantly different from the hands-on group and the traditional worksheet group (Johnson, et al, 1997).

A later study into integration using aquaculture curriculum by Conroy and Walker (2000) found that integration is effective when a multi-disciplinary approach is used. In their study agricultural instructors (n=750), FFA members (n=100), and focus groups which contained both adults and students (n=160), students and teachers believed that aquaculture helped to strengthen an understanding of math and science principles (Conroy & Walker, 2000). The authors also argued that some agriculture instructors did not have adequate academic knowledge to teach at an in depth level (Conroy & Walker, 2000). They further argued, "The key to effective integration did not lie with aquaculture; rather successful integration was possible when individual teachers made it happen" (Conroy & Walker, 2000, p. 62).

One study from the early part of this decade strongly supports the integration of agriculture and science. Chiasson and Burnett (2001) found that of Louisiana 11th grade students (N=41553), students enrolled in agriscience courses scored significantly higher on the science portion of the state standardized test than students not enrolled in agriscience. They concluded that, "Agriscience students were better prepared to pass the 11th grade science portion of the Louisiana GEE (Graduate Exit Examination) than non-agriscience students" (Chiasson & Burnett, 2001, p.67).

Nordstrom, Richards, Wilson, Coe, Fivek, and Brown (2000) recommended, "Schools should be encouraged to merge agriculture, science, and technology (agriscience) and integrate it into their science curricula" (p. 38). The VGSA provides an integrated approach to the study of agriculture and science for Virginia's gifted and talented students (VGSA, 2004b). This integrated approach helps students to develop skills through real-world applications. It also exposes students to the many career opportunities in agriculture (VGSA, 2004b).

Definition of Gifted and Talented Students

In 1972, the U.S. Commissioner of Education, Sydney Marland, presented the following definition of gifted students to Congress:

> Gifted and talented children are those, identified by professional and qualified persons, who by virtue of outstanding abilities are capable of high performance. These children who require differentiated educational programs and/or services beyond those normally provided by the regular school program in order to realize their contributions to self and society.
>
> Children capable of high performance include those with demonstrated achievement or potential in the following categories, singly or in combination:
> 1. General intellectual ability (with I.Q. scores in the top 3-5%)
> 2. Specific academic ability

3. Creative and productive thinking
4. Leadership ability
5. Visual and performing arts
6. Pscychomotor ability (Marland, 1972, p. 2).

The sixth category was removed from the definition when the Gifted and Talented Children's Education Act of 1978 was enacted (Smutny & Blocksom, 1990).

Abraham Tannenbaum, a renowned researcher of gifted and talented students from Columbia University, said these students are "outstanding consumers and producers of knowledge and ideas in any worthwhile endeavor, whether in math, engineering, music or social leadership" (Epstein, 1979, p. 37). The Council for Exceptional Children defines these students as "those children and youth whose abilities, talents and potential for accomplishment are so outstanding they require special provisions to meet their educational needs. These are persons of exceptional promise whose capabilities predict contributions of lasting merit in widely varying fields" (Epstein, 1979, p. 37).

The official Virginia Department of Education definition is that gifted and talented students are those students "whose abilities and potential for accomplishment are so outstanding that they require special educational programs to meet their needs" (Virginia Department of Education n.d., n.p.). In summary, gifted and talented students with abilities and potential that are higher than other students, that they require special programming to address their educational needs.

Characteristics and Needs of Gifted and Talented Students

Some experts have argued that there are no gifted children; there are gifted behaviors (Smutney & Blocksom, 1990). As Epstein (1979) noted, gifted and talented students are individually unique; however, they tend to have common characteristics.

Gifted and talented students rarely possess all characteristics. Some students are gifted in academic areas such as math and science; whereas, others are gifted in the arts such as performing and visual arts (Epstein, 1979).

Feldhusen, Van Tassel-Baska, and Seeley (1989) have divided characteristics of gifted and talented students into two categories: cognitive and affective. Gifted students display unique behavior associated with the cognitive domain from an early age. These characteristics will continue to expand as the child grows older with the proper nurturing. If proper nurturing is not provided, these characteristics could act as a hindrance to the child's development, or they could be hidden because of the vulnerability of the child (Feldhusen, Van Tassel-Baska, & Seeley, 1989). Specific cognitive domain characteristics are ability to manipulate abstract symbol systems, power of concentration, unusually well developed memory, early language interest and development, curiosity, preference for independent work, multiple interests, and ability to generate original ideas (Feldhusen, et al., 1989). Feldhusen's group made the following argument about cognitive characteristics:

1. Not all gifted children will display all of the characteristics;
2. There will tend to be a range among gifted children in respect to each characteristic;
3. These characteristics may be viewed as developmental in the sense that some children may not display them at early stages of development but may at later stages. Others may manifest the characteristics from a very early age; and
4. Characteristics of the gifted tend to cluster and thus constitute different profiles across children as the combination of characteristics varies (Feldhusen, et al., 1989, p. 17).

Feelings and emotional development characterize the affective domain (Huitt, 1999). Affective characteristics consist of sense of justice; altruism and idealism; sense of humor; emotional intensity; early concern about death; perfectionism; high levels of

energy; strong attachments and commitments; and aesthetic sensitivity (Feldhusen, et al., 1989). These affective characteristics are typically more developed in gifted and talented students than in their peers.

Gifted and talented students display characteristics that are different from "normal" students, and they may feel "out of sync" for their age. These students, even though they excel intellectually in most cases, are more typical in regards to physical or emotional development (Feldhusen, et al., 1989). Because of these special needs, programs have been developed to provide educational opportunities for the gifted and talented students.

Teaching Gifted and Talented Students

Feldhusen (1998) argued,

> It is clear, that highly talented, precocious, youth who are motivated to develop their talents need teachers, curriculum, and peers who are able to operate educationally at advanced levels and provide educational challenges that talented youth need to sustain and encourage the development of their talents to the highest levels of creative achievement or expertise (Feldhusen, 1998, p. 3).

Several years later, Feldhusen (2001) further argued that gifted and talented students should receive structured learning activities which provide them with an opportunity to demonstrate their potential talent. Schools can provide programs, curricula, and services for the gifted and talented when specific students' talent strengths are identified and educational services are focused on these talents (Feldhusen, 2001).

In reviewing the literature with regard to curriculum for gifted and talented students, two types of curriculum stand out. The first is *enrichment*, which refers to curriculum that has been modified or added to in order to provide the student with a

richer experience (Davis & Rimm, 1994; Howley, Howley, & Pendarvis, 1986; Schiever & Maker, 1997). Schiever and Maker (1997) noted, "These modifications or additions may be in content or teaching strategies, and ideally they are based on the characteristics of the learners for whom they are designed" (p. 113). Curriculum that has greater depth or breadth than that provided by general courses are considered enrichment programs (Schiever & Maker, 1997).

Many approaches that vary greatly are labeled as enrichment. Because of this research is difficult to summarize (Schever & Maker, 1997). In general, authorities argue that programs that adjust curriculum to students' abilities, specifically gifted and talented students, have clearly affected children in a positive manner (Kulik, 1992; Schiever & Maker, 1997).

The second type of curriculum programs is acceleration. An example of an acceleration delivery system is early entrance to kindergarten or college. Grade skipping is also considered a form of acceleration (Schiever & Maker, 1997). There is also curriculum that is considered partial acceleration programs. Students who enter a higher grade level for a portion of the school day for advanced instruction are participating in partial acceleration programs (Schiever & Maker, 1997). Schiever and Maker (1997) argued that acceleration programs are an economical means of providing for gifted students.

There are several drawbacks to acceleration programs; first, early entrance to a higher grade or college could be difficult for some students because they are not as physically mature as others (Schiever & Maker, 1997). "This disadvantage becomes more pronounced during the middle and high school years, when physical maturation determines athletic prowess and influences heavily an individual's self-confidence"

(Schiever & Maker, 1997, p. 115). Another drawback associated with acceleration is that this delivery method fails to provide gifted and talented students with differentiated curriculum (Schiever & Maker, 1997). "Students receive instruction and have learning experiences that are designed for average students who are older than the gifted students, but the curriculum is not changed to match the needs of the gifted (Scheiver & Maker, p. 115-116. 1997).

Research indicates that acceleration can be a curriculum delivery means for gifted and talented students. Students exposed to curriculum delivered acceleration programs have shown academic achievement and social adjustment that is equal to or better than other systems of delivery (Kulik, 1992; Scheiver & Maker, 1997; Van Tassel-Baska, 1986). Benbow and Lubinski (1997) found that the acceleration method appeared to be successful because it provided gifted and talented students with a challenging education "at a pace commensurate with their ability levels" (Benbow & Lubinski, 1997, p. 165).

Special Programs for the Gifted and Talented

Researchers believe that special programs such as those that take place during the summer and on Saturdays are vital to meet the special needs of gifted and talented students (Olszewski-Kubilius, 1997). The level of challenge provided by these programs and the pace of learning are vastly different from the regular school classroom. Experiences provided by special summer or Saturday programs are more suitable to the intellectual capacities of gifted and talented students. These programs provide "opportunities for independent inquiry, in-depth study, and accelerated learning" (Olszewki-Kubilius, 1997, p. 180).

Special summer and Saturday programs are needed because schools have failed to provide for gifted and talented students (Olszewki-Kubilius, 1997). Schools fail to provide special programming for this group of students because many lack proper funding, and some lack properly trained teachers. In rural areas, there have not been enough students to justify special programs for the gifted learners (Olszewki-Kubilius, 1997).

Students in the United States are predominately grouped by age, not by ability. However, special summer and Saturday programs for the gifted and talented group students by ability (Olszewki-Kubilius, 1997). As Olszewki-Kubilius (1997) argued, students are separated by athletic ability; it is only natural that they should also be separated by academic ability.

Special summer programs helped to relieve students of the boredom that some associate with the regular classroom (Rimm, 1991; Olszewski-Kubilius, 1997). Gifted and talented students can develop a pattern of underachievement from "regular" classrooms. There is also a lack of academic support among the peers of gifted and talented students (Olszewski-Kubilius, 1997).

Summer and Saturday programs that have a career education component have been found to be highly successful (Colson, 1980; Olszewski-Kubilius, 1997). Referring to a Texas A&M program for gifted and talented high school students, Olszewski-Kubilius (1997) wrote, "Participants queried one year after program completion felt that the career education program was the single most significant event of their senior year and that it was the best preparation for later decision making"(Olszewski-Kubilius, p. 186, 1997).

Successful programs from other states that preceded the VGSA include the Purdue Academic Leadership Program (PALS) in Indiana, the University for Youth in Colorado, and the Pennsylvania Governor's School for Agricultural Sciences (Feldhusen & Clinkenbeard, 1982; Purdue University, 2004; Seeley, Katz, & Linder, 1981). The program at Purdue, which is now the Gifted Education Resource Institute, was "designed to introduce students to college-level study and to career information in the fields studied" (Feldhusen & Clinkenbeard, 1982, pp. 179-180). The program in Colorado which is a program of the University of Denver is designed for elementary students (University of Denver, n.d.).As Stadelman, et al., (1986) argued in support of summer programs similar to those just mentioned, summer residential programs are valuable tools in providing students with advanced education and exposure to career opportunities in the agricultural industry.

Pennsylvania Governor's School for Agricultural Sciences

A review of the literature found several items related to the Pennsylvania Governor's School for Agricultural Sciences (PGSAS). The PGSAS is a five week summer program in the state of Pennsylvania open to students who have demonstrated a high ability in science and who have interest in agriculture (Houser & Baker, 1991). The PGSAS began in 1986 at Penn State University (Houser & Baker, 1991). The school was described as a response "to the critical need for agricultural scientists and professionals" (Houser & Baker, 1991, p. 18). The program offered students with opportunities for exploration in science, technology, food policy, and natural resources (Mortenson, 1989).

The goals of the PGSAS are as follows:

1. Provide educational programs in agriculture and environmental science to gifted and talented high-school-age youth;
2. Challenge these youth to use their talent and intellect in studying and researching the scientific nature of agriculture and its interrelationship with the environment;
3. Acquaint high-school-age youth with the scientific and professional opportunities available to them in the food, agriculture, and natural resource sciences;
4. Promote an atmosphere of multicultural diversity, dialogue, learning, and respect (Pennsylvania Governor's School for Agricultural Science, 2004).

The school has the following objectives:

1. To provide an academically talented group of students in Pennsylvania with opportunities to expand to expand their knowledge of food, agriculture and the sustainable use of renewable natural resources, recycling and waste reduction, and their understanding of the high technologies involved, in ways not usually found in their own schools;
2. To provide the PGSAS participants with an opportunity to become exposed to scientific concepts, land stewardship concepts, laboratory facilities, and the facilities and professional scientists not normally available at high-school level;
3. To provide hands-on experience in new technologies and research techniques available in food, agricultural, and natural resource sciences;
4. To assist the PGSAS participants in learning that agricultural sciences provide an array of interesting and rewarding careers;
5. To encourage PGSAS students to develop leadership, communication, problem-solving, and interpersonal skills, and to apply them upon returning to their home districts;
6. To establish an environment where PGSAS participants from different backgrounds can interact and share (Houser & Baker, 1991, p. 18-19, Pennsylvania Governor's School for Agricultural Science, 2004).

Research on the PGSAS focused on early schools. Hoover and Houser (1991) showed that of the students who completed the PGSAS from 1986-89 (N=237), 47% of the students enrolled at Penn State University and 30% enrolled in the College of Agriculture. Of the students who attended the 1990 PGSAS (N=63), the percentage of students who would like to pursue a career in agriculture was slightly higher at the conclusion of the school than at the beginning, 73% before and 79% after. In the 1990 PGSAS, a high number of students were already interested in agriculture before the school began (Hoover and Houser, 1991).

The Hoover and Houser study also presented research on student perceptions toward agricultural careers. The Pennsylvania students perceived that biotechnology and genetic engineering as the most exciting careers in agriculture, and community nutrition and toxic waste as the least exciting (Hoover & Houser, 1991). Hoover and Houser (1991) also concluded that 1990 PGSAS students consistently felt that occupations in agriculture meant hard work, moderate to low pay, and a lack of prestige. The researchers concluded that participation in the Pennsylvania program, lead to a reinforcement of student aspirations to pursue careers in agriculture, and an increase in student knowledge of agriculture (Hoover & Houser, 1991).

A more recent study of the PGSAS was conducted in the late 1990s by Nordstrom, Wilson, Richards, Coe, Fivek, and Brown (1999). This study collected data from three PGSAS classes, 1996 through 1998 (N=192). All students who participated in the PGSAS completed a pre- and post-test during the "Contemporary Issues in Animal Agriculture" course. They prefaced their findings with the argument that the major barrier to agricultural education in the United States is access to educational opportunity. The researchers cited that in 1997 only 35% of Pennsylvania high schools and vocational schools offered courses in agriculture. They argued that many agricultural programs were designed for individuals who plan to enter the workforce upon high school graduation. According to Nordstrom et al, the PGSAS was a response to the problem of access to educational opportunity. This group of researchers pointed to the Hoover and Houser (1991) study when they said, "Participation in PGSAS has guaranteed access to educational opportunity and has resulted in increased subsequent enrollment in colleges of agriculture" (Nordstrom, et al., 1999, p. 11).

Nordstrom's group pointed out that the PGSAS provided truthful information, thus promoting agricultural literacy for the participants. Participants in PGSAS gained accurate information and had a better understanding of how agriculture affected their lives. The PGSAS program provided programs above and beyond school districts capabilities in agriscience for academically-talented high school students. Students who participated in PGSAS held more positive perceptions of animal agriculture at the conclusion of the program (Nordstrom, et al., 1999).

The drawback to programs such as the PGSAS is that participation is limited only to gifted and talented students who show an interest in agriculture (Nordstrom, et al., 1999). The researchers write, "All students, not just the academically-talented or agriculturally interested, should be encouraged to explore careers and expand their knowledge of agriculture" (Nordstrom, et al., 1999, p. 18). They further argued that agri-science should be continued to merge into the science and technology curriculum throughout the nation's school systems (Nordstrom, et al., 1999). A follow-up paper by the Nordstrom group recommended that "the PGSAS should be used as a model for other universities and colleges that have an agricultural curriculum" (Nordstrom, et al., 2000, p.38).

From the research, students who have participated in the Pennsylvania Governor's School for Agricultural Sciences have shown an increase in knowledge and perceptions of agriculture. Because of their experience in Pennsylvania, students have made decisions to attend a college of agriculture, most notably Penn State. These students, also because of their experience, have decided to pursue careers in agriculture.

Previous VGSA Research

The VGSA program was implemented in 2001. Four groups of gifted and talented students have been to Blacksburg for the four week program. Because of this, the research that specifically pertains to the program is limited. Duncan and Broyles (2004) used a questionnaire to generate demographic data about the 2003 VGSA class (N=86). There was also a pre- and post-test component to their questionnaire which was used to determine levels of knowledge and perception by the students. Demographically, 45% of the 2003 students were from suburbs, and 80% were not enrolled in high school agricultural education programs in their home school division (Duncan & Broyles, 2004).

The researchers found that 2003 VGSA students with exposure to agriculture before attending the school had more positive perceptions and higher levels of knowledge about agriculture than those students with little or no exposure. Also, the VGSA increased 2003 students' knowledge of agriculture by a small amount. Finally, post-test results showed that student awareness of the impact of agriculture on society had increased at the conclusion of the school. This included the impact of agriculture on such issues as biotechnology, the environment, and animal rights/welfare (Duncan & Broyles, 2004).

Summary

A review of relevant literature indicates a need for qualified people to work in the diverse careers in agriculture. The literature shows that in the past, students have not pursued careers in the industry because of low perceptions and a lack of knowledge of the agricultural industry. In order to increase the perceptions and knowledge that students hold toward the agricultural industry, it has been recommended that agricultural

education be expanded to include agricultural literacy. Strategies such as the integration of agriculture with academic subject matter have been suggested as a way to advance agricultural literacy.

Gifted and talented students are a specific population of students who have the potential to study agriculture and then pursue careers in the industry. Gifted and talented students have special needs that require specific curriculum in order to enhance their educational experiences. Summer programs have been shown to meet those needs, and those programs that provide a career education component have been very successful. The VGSA is a summer program that provides an enriching experience centered around agriculture to gifted and talented students.

Chapter 3

Methodology

This chapter examines the procedures for collecting and analyzing the data for this study. The objectives of the study were:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni;
2. Determine the alumni perception of the influence of the Virginia Governor's School for Agriculture on participants' choice of institution for post-secondary education;
3. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' choice of major or field of study;
4. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' career goals; and
5. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' knowledge and perception of the agricultural industry.

This chapter will include a description of the study, description of the instrument, the methods used for data collection, and the methods used for data analysis.

Description of the Study

This was a quantitative study. Rossman and Rallis (2003) noted that quantitative research involved "predictive statements grounded in a theory or speculation about how two or more variables are related" (p. 8). They further wrote, "Such research seeks outcomes that are measurable with a number such as a score, rating, or amount" (Rossman & Rallis, 2003, p. 8).

This study used a descriptive design. Issac and Michael (1990) noted that the facts and characteristics of a population are systematically described with a degree of accuracy. A mail survey was developed that provided descriptive data that would seek to achieve the objectives of the study.

The mail survey was developed using procedures suggested by Dillman (2000) as a guide. Dillman (1991) described two advantages to the use of a mail survey: the low cost of administration and simple procedures. Dillman (1991) further noted:

> "The sample survey is distinguished from other research methods frequently used . . . by its ability to estimate quantitatively the distribution of a characteristic in a population, and to accomplish this by obtaining information (answers to questions) from only a small proportion of that population . . . (pp. 226-227).

Population and Sample

All students who had completed the VGSA program comprised the population of this study. Burns (2000) defined population as "an entire group of people or objects or events which all have at least one characteristic in common, and must be defined specifically and unambiguously" (p. 83). The common characteristic of this population was completion of the VGSA program. A sample is any portion of a population (Burns, 2000). Dillman (1991) argued, "A good sample survey, by whatever method, is one in which all members of a population have a known opportunity to be sampled for inclusion in the survey . . . " (p. 228). All VGSA alumni had an opportunity to participate in this study. However, not all of the students returned the instrument. Therefore the sample consisted of those alumni that returned the instrument.

There have been four groups of gifted and talented students who have completed the program. The first class was in the summer of 2001 with the fourth in 2004. Fifty-one

students completed the 2001 VGSA, 85 students completed the 2002 school, 87 students completed the 2003 school, and 93 students completed the 2004 VGSA (N=316). Only students who had completed the four-week school were included in the population.

Instrument

The instrument was developed after a review of relevant literature on previous studies (Betts & Newcomb, 1986; Carter & Leibold, 1987; Colson, 1980; Duncan & Broyles, 2004; Hoover & Houser, 1991; Houser, 1991; Mallory & Sommer, 1986; Pense & Leising, 2004) and a review of literature related to mail surveys (Dillman, 2000; Dillman, 1991; Dillman, 1978).

In developing a survey, Dillman (2000) suggested a four-stage approach: review by knowledgeable colleagues and analysts, interviews to evaluate cognitive motivational qualities, a small pilot study, and final review.

The first stage of the development of the instrument was completed with assistance from knowledgeable colleagues of the Virginia Tech Agricultural and Extension Education faculty and VGSA staff. A draft survey was completed and presented to seven Virginia Tech Agricultural and Extension Education students to complete stage two. Changes were made and a survey in booklet form was administered to a pilot group of five students from Christiansburg High School in Virginia. These students were enrolled in agricultural education courses and they ranked high academically at the school. Suggestions were made by these students and further suggestions were made by agricultural education professionals. Changes were made and a draft was administered to a pilot group of five students from Avon High School in Illinois

to establish face and content validity. Final changes were made and colleagues from Virginia Tech made the final review of the instrument. Approval for the survey was granted by the Virginia Tech Institutional Review Board (IRB). A copy of the IRB form is included in the Appendix A.

The instrument that was administered to the population was comprised of four sections. A copy of the instrument is found in Appendix C. Section one contained items (1-6) related to objective one:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni.

Students were asked which VGSA class they had completed, what major they completed, their ethnicity, gender, and the population of their home community. The item concerning ethnicity was developed using the Virginia Department of Education's Summer Residential Governor's School application and the Virginia Tech admissions application as guides (Virginia Department of Education, 2004; Virginia Tech, 2004). The item concerning the students' home was developed using United States Department of Agriculture's classification of labor markets as a guide (United States Department of Agriculture, 2003).

The second part of the questionnaire was developed for VGSA alumni who were in high school at the time they completed the survey. These items were designed for the following four objectives of the study:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni;
2. Determine the alumni perception of the influence of the Virginia Governor's School for Agriculture on participants' choice of institution for post-secondary education;

3. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' choice of major or field of study; and
4. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' career goals.

Items 7 through 19 pertained to student demographic information. Students were asked questions about their high school, class rank, grade point average, standardized exams that had been completed, scores on the standardized exams, number of advanced courses that they had completed or were currently enrolled, number of agricultural education courses, FFA membership, 4-H membership, and future plans. The item concerning advanced academic courses was developed using the Virginia Tech admissions application as a guide (Virginia Tech, 2004).

Items 20 through 25 were specifically related to objectives two through four. Students were asked what college/university they planned to attend upon graduation from high school, in what major they planned to enroll, and what career they planned to pursue. A Likert-type scale item was asked for each of the previous questions in order to determine the influence that the VGSA had on students' choice of institution, major, and career. A five point Likert-type item was used with the extremes being no influence and much influence. The Likert method is a measure of attitude along a five-point scale (Burns, 2000). Burns (2000) noted the advantages of the Likert scale:

1. Greater ease of preparation;
2. The fact that the method is based entirely on empirical data regarding subjects' responses rather than subjective opinions of judges; and
3. The fact that this method produces more homogeneous scales and increases the probability that a unitary attitude is being measured, and therefore that validity (construct and concurrent) and reliability are reasonably high (p. 560).

Students were asked open-ended items to explain their response to the Likert-type items.

Part three of the questionnaire was developed for VGSA alumni who had completed high school at the time of the survey. These items were also designed for objectives one through four noted above. Students were asked items (26-39) about their high school, class rank, grade point average, standardized exams that had been completed, scores on standardized exams, number of advanced courses that they had completed, number of agricultural education courses, FFA membership, 4-H membership, and future plans. The item concerning advanced academic courses was also developed using the Virginia Tech admissions application as a guide (Virginia Tech, 2004).

Items 40 through 46 were specifically related to objectives two through four. Students were asked what college/university they were attending, what major they were enrolled, and what career they planned to pursue. A Likert-type scale item was asked for each of the previous questions in order to determine the influence that the VGSA had in students' choice of institution, major, and career. A five-point Likert-type item was used with the extremes being no influence and much influence. Open-ended items were asked of the students to explain their responses to the Likert-type items.

Part four was developed for all VGSA alumni. Item 49 was a Likert-type item which was used for the following objective:

5. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' knowledge and perception of the agricultural industry.

Items 50 and 51 were open-ended questions that asked the students their thoughts on the best part of the VGSA and what changes the students would recommend. These items

were developed to provide information to the VGSA staff. Item 51 was a demographic question which was used to gain information about the areas that the students had been identified as gifted.

The Likert-type items were tested for reliability. A Cronbach's alpha of .720 was established for reliability.

Dillman (2000) recommended that surveys be printed as a booklet because people are more familiar with this format just as if they were reading a book. This would provide the sample with a perception that the survey was easier to complete (Dillman, 2000). The instrument for this study was printed in a booklet format using Microsoft Publisher software.

A cover letter was developed by the VGSA staff explaining the purpose of the survey. A copy of the cover letter is located in the Appendix B. The cover letter also emphasized that students' responses would only be reported in the aggregate, not individually. This insured the students of the confidentiality of the study. The letter was signed by the director and assistant director of VGSA. The cover letter is an important part of the mail survey method (Dillman, 2000).

Mailing Procedures

The contents of the mailing included the cover letter, questionnaire, and return envelope. A parental consent form for students under the age of 18 was also included to satisfy Virginia Tech IRB requirements. A copy of the consent form is located in the Appendix A.

The contents were mailed using a first class stamp. There are several advantages to using first class. Members of the sample perceive the contents as important when it is delivered by first class instead of bulk rate (Dillman, 1978). First class mail is second only to special delivery in regards to priority by the United States Postal Service (USPS) (Dillman, 1978). Dillman (1978) also pointed out:

> If the recipient has moved, it (the package) will be forwarded automatically for 1 year after the change of address. If it cannot be delivered for any reason, the letter will be returned to the sender, often with notations that may be helpful in tracing respondents or calculating return rates (pp. 175-176).

Business reply envelopes provided by the Virginia Tech Department of Agricultural and Extension Education were used for students to return the survey. The use of business reply envelopes is not as time consuming as applying postage stamps, and they saved on costs because not all surveys are returned by the sample. The USPS only charged for those envelopes returned. The surveys were mailed using the student lists provided by the VGSA.

Follow-Up Mailings

Dillman (2000) provided the following sequence for follow-up mailings:

A brief prenotice letter that is sent to the respondent a few days prior to the questionnaire.

A questionnaire mailing that includes a detailed cover letter explaining why a response is important.

A thank you postcard that is sent a few days to a week after the questionnaire.

A replacement questionnaire that is sent to nonrespondents 2-4 weeks after the previous questionnaire mailing.

> A final contact that may be made by telephone a week or so after the fourth contact (p. 151)

The use of these procedures produce higher return rates (Dillman, 2000).

Dillman's (2000) methods were modified for this study. This study did not use the pre-notice letter because of cost constraints. The questionnaire packet was sent to the students between January 6 and 10, 2005. The follow-up thank you postcard was sent to the students January 31, 2005, three weeks after the first mailing. As Dillman (2000) suggested, this was sent to all students. The third mailing was sent to all non-respondents on February 21, 2005 by first class mail. Instead of phone calls for the final follow-up, personalized emails were sent to the students shortly after the third mailing. Several students returned their survey in person, because they are Virginia Tech students. These students were asked to encourage those who they communicated with to participate in the survey.

Non-Respondents

Non-response error was of concern to the researcher. According to Dillman (2000), non-response is a possible source of error in sample survey research. Lindner, Murphy, and Briers (2001) remarked, "This type of error exists to the extent that people included in the sample fail to provide usable responses and are different than those who do on the characteristics of interest in the study" (p. 44). It is recommended that non-respondent bias checks be conducted when the response rate is less than 90% (Smith & Glass, 1987).

Lindner et al (2001) proposed three protocols and procedures to address non-response error. The three methods are comparison of early to late respondents, using the

number of days to respond as a regression variable, and comparison of respondents to non-respondents (Lindner, et al., 2001). For this study, the first and third methods were used. In order to complete analysis of non-respondents, Tuckman (1999) recommended that data be obtained from 5 to 10% of the non-respondents. Lindner, et al. (2001) argued that there be a minimum of 20 responses from a random selection of non-respondents. They further said, ". . . If fewer than 20 nonrespondents are obtained, their responses could be combined with other respondents and used in conjunction with method 1 or 2" (Lindner, et al., 2001, p. 52).

A group of 25 non-respondents were randomly selected. An attempt to contact these students was done by telephone. The survey instrument was read to the students, and their response to the items was recorded. Of this group, contact was made with only 10 students. Because this was less than the sample size (n=20) that Lindner et al. (2001) recommended for non-responders, the researcher combined the non-responders with 20 randomly selected late responders in order to test for non-response error. The researcher followed protocol guidelines recommended by Lindner et al. (2001) for comparing early to late responders. They suggested that non-responders be combined with late responders when the sample of non responders is less than 20 (Lindner, et al., 2001). The characteristics of the sample of non-responders and late responders were similar to the sample as a whole. An analysis of the data found no significant difference between early and late responders.

Data Analysis

Data from the returned surveys were analyzed using the SPSS 13.0 for Windows Student Version software. In order to measure demographic information, frequencies were used as the statistical measure. Means and standard deviations were used to measure statistically the influence of the VGSA on students' choice of institution, major, and career. In order to measure the influence of the VGSA on students' knowledge and perception of agriculture, means and standard deviations were also used. Means were compared with t tests and Analysis of Variance (ANOVA).

Summary

This was a descriptive study that utilized a mail survey. An instrument with four sections was developed using three pilot groups, Virginia Tech agricultural education students, Christiansburg (Virginia) High School students, and Avon (Illinois) High School students. The first section was developed with items used for determining demographic information of all VGSA alumni. The second section consisted of items for students who had not graduated from high school. Section three consisted of items for students who had completed high school. Sections two and three contained items which generated demographic data; and items which pertained to the influence of the VGSA on students' choice of college/university, major, and career. The fourth section contained an item related to students' knowledge and perceptions of agriculture. There were also items that were for evaluative purposes for the VGSA. A modified version of Dillman's (2000) mail survey procedures was used for this study.

The results of this study are found in chapter 4, and the conclusions and recommendations are found in chapter 5. The research instrument, cover letters, and IRB form are found in the appendices.

Chapter 4

Findings of the Study

The purpose of this study was to examine the perception of the influence of the Virginia Governor's School for Agriculture (VGSA) on the four cohorts of students who have completed the school. This chapter examines the findings as they relate to the purpose and specific objectives of the study.

The specific objectives of this study were to:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni;
2. Determine the alumni perception of the influence of the Virginia Governor's School for Agriculture on participants' choice of institution for post-secondary education;
3. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' choice of major or field of study;
4. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' career goals; and
5. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' knowledge and perception of the agricultural industry.

Survey instruments were sent to all students who had completed the VGSA program (N=316). Of the instruments which were mailed, 11 were returned by the postal because of an outdated address. This resulted in an accessible population of 305. The number of instruments that were returned was 182 (58%). Fifty one students completed the VGSA program in 2001, and of that number 26 (51%) participated in the study. Of the 85 students who completed the program in 2002, 40 (48%) returned the instrument. Eighty seven completed the 2003 VGSA, and 50 (58%) returned the instrument. Finally, 93 students completed the 2004 school, of which 66 (71%) participated in the study.

Demographic Information

This section provides findings with regards to the demographics and characteristics of the VGSA alumni who completed the instrument. Comparisons are made concerning the demographics and characteristics. However, due to the nature of the data, statistical differences are not analyzed in this section.

The number of respondents increased with each successive year. The class of 2004 had the highest number of graduates returning the instrument (n=66), while the class of 2001 had the lowest number of graduates returning the instrument (n=26). Note Table 1 where various demographic variables are displayed. Just as females represent a higher portion of the sample than males, females were a larger proportion of the students who have completed the program. The percentage of females that have completed the program is 60% and males represent 40% (VGSA, 2001; VGSA, 2002; VGSA, 2003; VGSA, 2004c).

The number of VGSA alumni from farm and small town/rural areas has been consistent for each class. However, the proportion of students from those areas has decreased in each successive year. The number and proportion of alumni from small urban and urban areas increased in each successive year (VGSA, 2001; VGSA 2002; VGSA, 2003; VGSA, 2004c). A large portion of the sample (63%) do not reside on a farm or in rural communities, and just over one third (39%) reside in urban areas of greater than 20,000.

White students (82%) were the dominant group of the sample. Asian students comprised 12% of the sample, while Blacks made up 7% of the sample. The total population of the VGSA comprised of 83% White students, 13% Asian students, and 4%

Black students (VGSA 2001; VGSA, 2002; VGSA, 2003; VGSA, 2004c). Four Hispanic students have completed the VGSA program. No Hispanic students returned the instrument.

Table 1

Respondents by Various Demographic Variables

	2001		2002		2003		2004		Total	
Variable	*n*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]
School Level										
High School	0	0	1	3	15	30	66	100	82	45
High School Graduate	26	100	39	97	35	70	0	0	100	55
Gender										
Male	6	23	18	45	18	36	23	35	65	36
Female	20	77	22	55	32	64	43	65	117	64
Residence										
Farm	9	36	10	26	7	14	13	20	39	22
Small Town/Rural	6	24	10	26	8	16	3	5	27	15
Small Urban	6	24	8	20	12	24	18	27	44	24
Urban	4	16	11	28	23	46	32	48	70	39
Race/Ethnicity										
White	25	96	37	93	40	80	48	73	150	82
Asian/Pacific Islander	0	0	3	7	8	16	11	16	22	12
Black	1	4	0	0	2	4	4	6	7	4
Native Hawaiian	0	0	0	0	0	0	1	2	1	1
Unknown/Unspecified	0	0	0	0	0	0	2	3	2	1

[a]Percentage of total for specified year.

Table 2 provides further demographic information. The frequency of respondents by VGSA major is displayed in this table. Agricultural Economics, Animal Science, and

Plant Science were available majors in all four schools. Veterinary Medicine was an available major for classes 2002 through 2004. The Natural Resources major was available in 2001, 2002, and 2004. Finally, Food Science was available in 2003 and 2004. As might be expected the three majors that were available for all four classes had the three highest frequencies. It should be noted that students are not guaranteed their first choice of major. Students are assigned majors by order of returned requests.

It is interesting to note, that FFA members made up a little more than one third (35%) of the sample. Of the total population, FFA members made up just under one third (29%) (VGSA, 2001; VGSA, 2002; VGSA, 2003; VGSA, 2004c). The number of FFA members has remained consistent from year to year; however the proportion of FFA members has drastically decreased from the first to the fourth year of the school. It should also be noted that 4-H members made up a little more than one quarter (26%) of the sample. Of the total population of students who have completed the VGSA, 4-H members also made up a little more than one quarter (26%) of all students who had completed the VGSA (VGSA, 2001; VGSA, 2002; VGSA, 2003; VGSA, 2004c). As with FFA, the number of 4-H members each year has remained constant; however the proportion has decreased in since the inception of the program.

Table 2

Respondents by Various Demographic Variables

	2001		2002		2003		2004		Total	
Variable	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]
VGSA Major										
Plant Science	6	23	9	22	12	24	11	17	38	21
Animal Science	6	23	9	22	9	18	10	15	34	19
Agricultural Economics	7	27	7	18	9	18	9	13	32	18
Veterinary Medicine	NA	NA	6	16	13	26	12	18	31	17
Natural Resources	7	27	9	22	NA	NA	11	17	27	14
Food Science	NA	NA	NA	NA	7	14	13	20	20	11
FFA Membership										
Member	18	69	16	42	13	26	17	26	64	35
Non-Member	8	31	22	58	37	20	49	74	116	65
4-H Membership										
Member	11	42	13	34	11	22	13	20	48	26
Non- Member	15	58	25	66	38	21	53	80	131	72

[a]Percentage of total for specified year.

Academic Characteristics

Eighty-two (45%) of the respondents were still in high school, while 100 (55%) had completed secondary education. These students represented 108 different schools from throughout Virginia. A list of the schools is displayed in Appendix G. The highest frequency (7) was from Gar-Field high school which is located in Woodbridge, a suburb of Washington, D.C. Based on the number of students reported by the respondents; the

average school size was 1328 with the smallest school population of 125 and the largest 3000.

Average student grade point averages (GPA) are shown in Table 3. GPAs are divided into specific groups. The overall mean GPA was 3.93. Seventy-three of the students reported a GPA of 4.0 or greater which was due to weighted scales. Among respondents, high school students (3.95) had a slightly higher GPA than those who have graduated from high school (3.92). The class of 2003 (3.95) had a slightly higher GPA than 2002 (3.94) and 2004 (3.94). The class of 2001 was the lowest (3.83). Female respondents (3.95) had a higher GPA than males (3.90). FFA members (3.81) had a lower GPA than non-members (4.00). The same is true of 4-H, with members (3.82) having a slightly lower GPA than non-members (3.93). Students from small urban areas (3.96) and urban areas (3.95) had mean GPAs higher than those from small town/rural areas (3.90) and farms (3.89) Asians had the highest mean GPA (3.97), followed by White (3.93) and Black (3.81) students respectively It should be noted that numerous students reported GPAs of over 4.0 which is the result of weighted grading. One must be cautious when comparing as the GPAs are not standardized.

Table 3

Student Grade Point Averages (GPA)

Variable	*n*	*M*	*SD*	*Min*	*Max*
Current Status					
High School Students	79	3.95	0.31	3.20	4.68
High School Graduates	96	3.92	0.35	3.03	4.80
VGSA Year					
2001	25	3.83	0.30	3.20	4.38
2002	38	3.94	0.41	3.20	4.80
2003	48	3.95	0.29	3.03	4.64
2004	66	3.94	0.32	3.20	4.68
Gender					
Male	63	3.90	0.35	3.03	4.80
Female	112	3.95	0.32	3.20	4.80
FFA Membership					
Member	63	3.81	0.32	3.03	4.41
Non-Member	111	4.00	0.31	3.25	4.80
4-H Membership					
4-H	46	3.82	0.37	3.03	4.80
Non-4-H	127	3.93	0.30	3.20	4.80
Residence					
Farm	36	3.89	0.34	3.20	4.53
Small Town/Rural	27	3.90	0.36	3.20	4.80
Small Urban	43	3.96	0.38	3.03	4.68
Urban	68	3.95	0.28	3.40	4.80
Race/Ethnicity					
White	143	3.93	0.33	3.20	4.80
Black	7	3.81	0.49	3.03	4.67
Asian	22	3.97	0.28	3.40	4.44
Other	3	3.99	0.16	3.80	4.10
All Students	175	3.93	0.33	3.03	4.80

Table 4 presents the mean GPA for each VGSA major. Student respondents who were in the Plant Science major had the highest mean GPA (4.02), while Natural Resources had the lowest (3.78).

Table 4

GPA by VGSA Major

Major	*n*	*M*	*SD*	*Min*	*Max*
Plant Science	37	4.02	0.31	3.47	4.80
Veterinary Medicine	28	4.00	0.35	3.20	4.64
Food Science	20	3.95	0.25	3.68	4.63
Animal Science	33	3.94	0.29	3.30	4.44
Agricultural Economics	31	3.87	0.37	3.03	4.67
Natural Resources	26	3.78	0.35	3.25	4.68
All Students	175	3.93	0.33	3.03	4.80

The average high school class rank was 18 out of an average class size of 297. Of the students, 137 responded to class rank. It is interesting to note that numerous students reported that their schools did not rank students. Fourteen (10%) of the 137 students were ranked number one in their class, and 44 (32%) were ranked in the top four. Table 5 displays a break down of the mean class rank by various demographic variables. Student class ranks among most of the variables were consistent, with students on average ranked in either the top 5% or top 6% of their class. However, male students ranked in the top 8% of their class, FFA members in the top 10%, and 4-H members in the top 9%. Students from urban areas ranked higher in their class than students from farms, small town, and rural areas. Asian students ranked higher in their class than White and Black students.

Table 5

Student Class Rank

Variable	*n*	*M*	*SD*	*Ranking by Percent of Class*
Current Status				
High School Students	63	21	19.71	6
High School Graduates	75	16	17.09	6
VGSA Year				
2001	19	12	14.46	6
2002	30	18	20.30	7
2003	41	19	18.87	6
2004	48	20	18.23	6
Gender				
Male	50	24	20.87	8
Female	88	15	16.16	5
FFA Membership				
Member	55	21	19.45	9
Non-Member	82	16	17.58	5
4-H Membership				
4-H	42	19	18.55	9
Non-4-H	94	18	18.39	5
Residence				
Farm	35	16	16.09	8
Small Town/Rural	23	12	15.76	9
Small Urban	34	18	20.15	5
Urban	46	23	19.35	6
Race/Ethnicity				
White	118	18	18.62	7
Black	5	32	23.63	7
Asian	13	17	12.87	4
Other	2	22	25.46	4
All Students	138	18	18.42	6

Displayed in Table 6 is class rank by VGSA major. Food Science students on average were ranked in the top 4% of their class which was the highest of the VGSA majors. Natural Resource students on average were ranked in the top 8% which was the lowest of the VGSA majors.

Table 6

Class Rank by VGSA Major

Major	*n*	*M*	*SD*	*Percent of Class*
Food Science	13	18	17.89	4
Plant Science	28	16	20.15	5
Agricultural Economics	28	16	12.44	6
Animal Science	24	21	17.31	7
Veterinary Medicine	28	19	20.94	7
Natural Resources	17	19	19.96	8
All Students	138	18	18.42	6

Most of the respondents to the instrument had completed the SAT. The mean SAT math score was 627 with a standard deviation of 89, and the mean verbal score was 630 with a standard deviation of 92. The range of math scores was from 400 to 800 and for verbal scores 300 and 810. Eighteen students had completed the ACT with a mean score of 25.11. The lowest reported ACT score was 16 and the highest was 31.

Table 7 presents SAT math scores for various demographic variables. High school students had a slightly higher mean SAT math score (629) than high school students (625). The VGSA class of 2002 had the highest mean SAT math score (644), with 2001 being the lowest (589). Interestingly, male (629) and female (627) SAT math scores were very close. FFA (559) and 4-H (573) members had lower SAT math scores than students who were not members (659 and 645 respectively) of those organizations respectively. Students from urban areas with a population of over 20,000 had the highest mean scores (654), while students from small town/rural areas with a population of less than 5,000 had

the lowest mean scores (614). Finally, Asian students (706) had the highest math scores of the race/ethnicity groups, while White students (612) had the lowest.

Table 7

Student SAT Math Scores

Variable	*n*	*M*	*SD*	*Min*	*Max*
Current Status					
High School Students	66	625	97	400	800
High School Graduates	75	629	82	400	800
VGSA Year					
2001	19	589	87	460	770
2002	29	644	92	400	800
2003	40	638	63	500	760
2004	53	624	102	400	800
Gender					
Male	51	629	107	400	800
Female	90	627	78	400	800
FFA Membership					
Member	45	559	73	400	690
Non-Member	95	659	78	400	800
4-H Membership					
4-H	34	573	70	400	710
Non-4-H	105	645	88	400	800
Residence					
Farm	27	627	71	400	720
Small Town/Rural	18	614	85	410	760
Small Urban	35	631	93	450	800
Urban	59	654	84	400	800
Race/Ethnicity					
White	114	612	81	3.20	4.80
Black	5	628	59	3.03	4.67
Asian	20	706	96	3.40	4.44
Other	2	735	35	3.80	4.10
All Students	141	627	89	400	800

In Table 8, SAT math scores by VGSA major are displayed. Food Science respondents had the highest mean SAT math score (654), while Natural Resources had the lowest (581).

Table 8

SAT Math Scores by VGSA Major

Major	*n*	*M*	*SD*	*Min*	*Max*
Food Science	14	654	64	570	760
Plant Science	36	648	92	400	800
Agricultural Economics	24	632	110	400	800
Animal Science	27	628	76	490	800
Veterinary Medicine	23	607	73	450	800
Natural Resources	17	581	94	410	750
All Students	141	627	89	400	800

Table 9 displays student SAT verbal scores by various demographic variables. As with math scores students who had completed high school had higher mean verbal score (638). The 2003 VGSA class had the highest mean score (650) of the four classes, while 2001 had the lowest (603). Female students (638) had a higher mean verbal score than males (615). FFA (580) and 4-H members (600) had lower mean verbal scores than those who were not members of those organizations (658 and 641 respectively). The highest mean verbal score were for students from urban areas (655); while students from farms had the lowest mean verbal scores (589). Asian students (662) had the highest mean score for the SAT verbal; while White students (625) had the lowest mean score for the verbal test.

Table 9

Student SAT Verbal Scores

Variable	*n*	*M*	*SD*	*Min*	*Max*
Current Status					
High School Students	66	621	106	300	800
High School Graduates	74	638	78	460	810
VGSA Year					
2001	19	603	75	460	710
2002	29	640	75	500	800
2003	39	650	78	510	810
2004	53	621	112	300	800
Gender					
Male	50	615	112	300	810
Female	90	638	79	420	800
FFA Membership					
Member	45	580	91	370	800
Non-Member	94	658	79	300	810
4-H Membership					
4-H	35	600	76	420	800
Non-4-H	103	641	95	300	810
Residence					
Farm	26	589	94	370	800
Small Town/Rural	19	624	74	500	770
Small Urban	34	620	85	400	770
Urban	59	655	96	300	810
Race/Ethnicity					
White	114	625	89	370	800
Black	5	632	56	570	710
Asian	19	662	118	300	810
Other	2	635	35	610	660
All Students	140	630	92	300	810

Table 10 presents SAT verbal scores by VGSA major. Plant Science students had the highest mean SAT verbal score (658), while Natural Resources had the lowest (584).

Table 10

SAT Verbal Scores by VGSA Major

Major	*n*	*M*	*SD*	*Min*	*Max*
Plant Science	36	658	99	300	800
Agricultural Economics	24	642	88	430	800
Animal Science	26	632	67	520	760
Food Science	13	628	100	400	810
Veterinary Medicine	24	609	97	300	810
Natural Resources	17	584	87	420	720
All Students	140	630	92	300	810

Perception of VGSA Influence on Post-Secondary Choice

Of the respondents to the survey, 100 (54.9%) had completed high school. Of those students, two are not currently enrolled in a post-secondary institution. One of the two is a partner in his father's dairy farm, and the other plans to attend college in the future. The mean college GPA for the respondents was 3.28. Of the 98 students who are enrolled in a college or university; 42 are freshmen, 33 are sophomores, 23 are juniors, and one is a senior. Three of the students were seeking associate's degrees.

Virginia Tech was the dominant institution that student respondents were attending with 54 VGSA alumni. The University of Virginia was second with 12 students enrolled. One Ivy League school, Cornell, had three former VGSA students. Cornell, as is Virginia Tech, is a Land Grant Institution. A complete list of the 27 institutions where VGSA alumni are enrolled and the number of VGSA students enrolled at those institutions is located in Appendix H.

All 82 current high school students responded that they plan to attend a college or university upon graduation. Forty-one of the high school students held an interest in attending Virginia Tech upon graduation. For 29 students, Virginia Tech was their only choice. Three students were planning to enroll at Harvard, and eight students were undecided. A list of all institutions that the students reported as a possibility is located in Appendix I.

As mentioned in the previous section, 98 (53%) of the survey sample are currently enrolled in post-secondary institutions. Fifty-four of those students were enrolled in the host institution for the VGSA, Virginia Tech. One of the two respondents who was not enrolled in a college or university was planning on doing so in the future. Of the 82 current high school students, all were planning on attending a college or university in the future, with Virginia Tech being either the only choice or a choice among several by 41. This section examines the effect of the VGSA on alumni choice of post-secondary institution.

Question 21 for high school students and question 44 for those who were high school graduates asked the students what influence the VGSA had on their choice of post-secondary institution. This was a Likert-type question with one being no influence and 5 being much influence. The mean score for the entire sample (n=180) was 3.37 with a standard deviation of 1.46. Fifty-four students responded that the VGSA had much influence (5), while 32 responded that the VGSA had no influence (1).

The perception of the influence of the VGSA on participants' choice of post-secondary institution by current status is displayed in Table 11. It should be noted that the perception of influence was slightly higher for non-high school students (M=3.41) than

high school students (M=3.33). An independent-samples t test was performed on the two means. The mean effect of the VGSA for current high school students (M= 3.33, SD=1.48) is not statistically significantly different (t=0.360, *df*=178, p=.719) from non-high school students (M=3.41, SD= 1.44).

Table 11

The Perception of the Influence of the VGSA on High School Students' and High School Graduates' Choice of Post-Secondary Institution

	High School Students (n=82)		High School Graduates (n=99)		
	M	*SD*	*M*	*SD*	*t*
Post–Secondary Choice	3.33	1.48	3.41	1.44	0.360

Note. Scale of 1=No Influence, 5=Much Influence

An Analysis of Variance (ANOVA) test was performed on the means and standard deviations of the perception of the influence of the VGSA on choice of post-secondary institution by the four classes. The influence of the VGSA on choice of post-secondary institution is presented in Table 12. The two classes with the highest mean were 2002 (M=3.49) and 2001 (M=3.46). With a F value at .17 with *df* 3, 176 at a significance level of .05, VGSA year does not have a statistically significant effect on the perception of the influence of the VGSA on post-secondary choice.

Table 12

The Perception of the Influence of the VGSA on Post-Secondary Choice by Year

	2001 (n=26)		2002 (n=39)		2003 (n=49)		2004 (n=66)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Post-Secondary Choice	3.46	1.65	3.49	1.25	3.31	1.49	3.32	1.50	0.17

Note. Scale of 1=No Influence, 5=Much Influence. F=.17, *df*= 3, 176, p<.05

The perception of the influence of the VGSA on participant choice of post-secondary institution by gender is displayed in Table 13. The mean for females (M=3.43) was slightly higher than for males (M=3.25). An independent samples t test was performed on the two means. The mean influence of the VGSA for male students (M= 3.25, SD=1.50) is not statistically significantly different (t=0.80, *df*=178, p=.427) from female students (M=3.43, SD= 1.44).

Table 13

The Perception of the Influence of the VGSA on Post-Secondary Choice by Gender

	Male Students (n=63)		Female Students (n=117)		
	M	*SD*	*M*	*SD*	*t*
Post-secondary choice	3.25	1.50	3.44	1.44	0.80

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of VGSA participation on the choice of post-secondary institution by home community is shown in Table 14. An ANOVA test was performed to compare the means. The mean for students (M=3.92) who resided in small town/rural areas was the highest. With an F value at 1.47 with *df* 3, 174 at a significance level of .05, the perception of VGSA influence on post-secondary choice was not different when comparing the size of home community.

Table 14

The Perception of the Influence of the VGSA on Post-Secondary Choice by Participants Home

	Farm (n=38)		Small Town (n=26)		Small Urban (n=44)		Urban (n=70)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Post-Secondary Choice	3.29	1.56	3.92	1.16	3.36	1.43	3.24	1.50	1.47

Note. Scale of 1=No Influence, 5=Much Influence. F=1.47, *df*= 3, 174, p<.05

The perception of the influence of the VGSA on participant choice of post-secondary institution by race/ethnicity is displayed in Table 15. Means of the different groups were compared by an ANOVA analysis. Discounting the Native Hawaiian student because such a small sample, the group with the highest mean was Black students (M=3.57 With an F value at .98 with *df* 3, 176 at a significance level of .05, perception of the influence of the VGSA on post-secondary choice was not different when comparing race and ethnicity.

Table 15

The Perception of the Influence of the VGSA on Post-Secondary Choice by Race/Ethnicity

Race/Ethnicity	*n*	*M*	*SD*
White (Not Hispanic)	148	3.44	1.44
Black (Not Hispanic)	7	3.57	1.81
Asian/Pacific Islander	22	2.95	1.46
Unknown/Unspecified	3	2.67	1.53

Note. Scale of 1=No Influence, 5=Much Influence. F=.75, *df*= 3, 176, p<.05

An ANOVA test was performed on the means and standard deviations of the influence of the VGSA on choice of post-secondary institution by VGSA major. The

influence of the VGSA on choice of post-secondary institution is presented in Table 16. The Veterinary Science major had the highest influence (M= 3.71), and Plant Science had the lowest influence (M=2.94). With an F value at 1.17 with *df* 5, 174 at a significance level of .05, perception of the influence of the VGSA on post-secondary choice was not different when comparing VGSA major. It should be remembered that even though students have input as to their VGSA major, students are not guaranteed their first choice.

Table 16

The Perception of the Influence of the VGSA on Post-Secondary Choice by VGSA Major

Major	*n*	*M*	*SD*
Veterinary Medicine	31	3.71	1.47
Food Science	20	3.60	1.39
Natural Resources	27	3.56	1.25
Agricultural Economics	32	3.31	1.57
Animal Science	34	3.29	1.47
Plant Science	36	2.94	1.51

Note. Scale of 1=No Influence, 5=Much Influence. F=1.17, *df*= 5, 174, p<.05

The perception of the influence of the VGSA on participants' choice of post-secondary institution by FFA membership is displayed in Table 17. The mean for FFA members (M=3.57) was higher than that of non-members (3.27). An independent samples t test was performed on the two means. The mean influence of the VGSA for FFA members (M= 3.57, SD=1.48) is not statistically significantly different (t=1.33, *df*=176, p=.186) from non-FFA members (M=3.27, SD= 1.43).

Table 17

The Perception of the Influence of the VGSA on Choice of Post-Secondary Institution by FFA Membership

	FFA Member (n=63)		Non-FFA Member (n=115)		
	M	*SD*	*M*	*SD*	*t*
Post–Secondary Choice	3.57	1.48	3.27	1.43	1.33

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participants' choice of post-secondary institution by 4-H membership is displayed in Table 18. The mean for 4-H members (M=3.50) was higher than non-members (M=3.33). An independent samples t test was performed on the means. The mean influence of the VGSA for 4-H members (M=3.50, SD=1.41) is not statistically significantly different (t=.71, *df*=175, p=.480) from non-FFA members (M=3.33, SD= 1.47).

Table 18

The Perception of the Influence of the VGSA on Choice of Post-Secondary Institution by 4-H Membership

	4-H Member (n=48)		Non-4-H Member (n=129)		
	M	*SD*	*M*	*SD*	*t*
Post–Secondary Choice	3.50	1.37	3.33	1.47	.71

Note. Scale of 1=No Influence, 5=Much Influence

Perception of VGSA Influence on College Major

Subjects were asked what influence the VGSA had on their choice of college major or field of study. This was a Likert-type question with one being no influence and

5 being much influence. The mean score for the entire sample (n=181) was 2.96 with a standard deviation of 1.46. Thirty-five students responded that the VGSA had much influence (5), while 44 responded that the VGSA had no influence (1). This section examines the influence of the VGSA on alumni choice major or field of study.

A list of the majors of VGSA alumni who were enrolled in college is located in Appendix J, and a list of planned majors for VGSA alumni who were enrolled in high school is located in Appendix K. Of the students who enrolled in college, 60 different majors or fields of study were identified by the respondents. An agricultural major, Animal Science, had the largest number of students (n=14). Forty-eight currently enrolled college/university students have an agricultural major or field of study.

Animal Science was also chosen the most as a future major or field of study by high school students (n=8). Students listed 43 different majors or combination of majors. Thirty-two high school students planned on enrolling in an agricultural major or field of study.

The perception of the influence of the VGSA on participants' choice of major or field of study by current status is displayed in Table 19. The mean perception of the influence of the VGSA on major or field of study for current high school students (M= 2.95, SD=1.41) is not statistically significantly different (t=0.09, *df*=179, p=.933) from non-high school students (M=2.97, SD= 1.48).

Table 19

The Perception of the Influence of the VGSA on High School Students' and High School Graduates' Choice of Major or Field of Study

	High School Students (n=82)		High School Graduates (n=99)		
	M	*SD*	*M*	*SD*	*t*
Choice of major or field of study	2.95	1.41	2.97	1.48	0.09

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participants' choice of major or field of study by year is presented in Table 20. The mean for the 2003 class (M=3.14) was the highest, and the mean for the 2002 class (M=2.69) was the lowest. An ANOVA test was performed on the means. With an F value of .75 with *df* 3, 177 at a significance level of .05, VGSA year does not have a statistically significant influence on college major or field of study.

Table 20

The Perception of the Influence of the VGSA on Alumni Choice of Major or Field of Study by Year

	2001 (n=26)		2002 (n=39)		2003 (n=50)		2004 (n=66)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of major or field of study	3.08	1.60	2.69	1.36	3.14	1.50	2.94	1.43	0.75

Note. Scale of 1=No Influence, 5=Much Influence. F=.75, *df* =3, 177, p<.05

Table 21 displays the perception of the influence of the VGSA on participants' choice of major or field of study by gender. The mean for female students (M=3.10) was higher than males (M=2.79). An independent samples t test was performed on the means. The mean influence of the VGSA on major or field of study for male students (M= 2.70,

SD=1.44) was not statistically significantly different (t=1.77, *df*=179, p=.078) from female students (M=3.10, SD= 1.45).

Table 21

The Perception of the Influence of the VGSA on Alumni Choice of Major or Field of Study by Gender

	Male Students (n=64)		Female Students (n=117)		*t*
	M	*SD*	*M*	*SD*	
Choice of major or field of study	2.70	1.44	3.10	1.45	1.77

Note. Scale of 1=No Influence, 5=Much Influence

In Table 22, the perception of the influence of the VGSA on participant choice of major or field of study by home community is displayed. The mean for students from rural and small towns with populations less than 5,000 (M=3.52) was the highest. An ANOVA analysis was performed on this data. With a F value of 2.15 with *df* 3, 175 at a significance level of .05, the perception of the influence of the VGSA on choice of college major was not different when comparing size of home community.

Table 22

The Perception of the Influence of the VGSA on Alumni Choice of Major or Field of Study by Participants' Home

	Farm (n=38)		Small Town (n=27)		Small Urban (n=44)		Urban (n=70)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of Major or Field of Study	3.13	1.60	3.52	1.17	2.73	1.47	2.81	1.43	2.15

Note. Scale of 1=No Influence, 5=Much Influence. F=2.15, *df* =3, 175, p<.05

The perception of the influence of the VGSA on participant choice of major or field of study by race/ethnicity is displayed in Table 23. The mean for Black students was

the highest (M= 3.14). The means were compared using an ANOVA analysis. With an F value of 1.43 with *df* 3, 177 at a significance level of .05, the perception of the influence of the VGSA on choice of college major was not different when comparing race/ethnicity.

Table 23

The Perception of the Influence of the VGSA on Alumni Choice of College Major or Field of Study by Participants' Race/Ethnicity

	n	*M*	*SD*
White (Not Hispanic)	149	3.03	1.46
Black (Not Hispanic)	7	3.14	1.46
Asian/Pacific Islander	22	2.59	1.26
Unknown/Unspecified	3	1.67	0.56

Note. Scale of 1=No Influence, 5=Much Influence. F=1.43, *df* =3, 177, p<.05

The perception of the influence of the VGSA on alumni choice of major or field of study by VGSA major is presented in Table 24. Veterinary Medicine students (M=3.22) had the highest mean, while Food Science (M=2.40)had the lowest. An ANOVA analysis was used to compare the means. With an F value of 1.14 with *df* 5, 175 at a significance level of .05, VGSA major does not have a statistically significant influence on college major or field of study.

Table 24

The Perception of the Influence of the VGSA on Alumni Choice of College Major or Field of Study by Participants' VGSA Major

	n	*M*	*SD*
Veterinary Medicine	31	3.32	1.60
Animal Science	34	3.12	1.36
Plant Science	37	3.00	1.49
Agricultural Economics	32	2.88	1.36
Natural Resources	27	2.81	1.39
Food Science	20	2.40	1.54

Note. Scale of 1=No Influence, 5=Much Influence. F=1.14, *df* =5, 175, p<.05

Table 25 displays the perception of the influence of the VGSA on alumni choice of major or field of study by FFA membership. Students who were members of the FFA (M= 3.22) had the highest mean. An independent samples t test was used to analyze the means. The mean influence of the VGSA on major or field of study for FFA members (M=3.22, SD=1.58) is not statistically significantly different (t=1.79, *df*=177, p=.076) from non-FFA members (M=2.82, SD= 1.36).

Table 25

The Perception of the Influence of the VGSA on Alumni Choice of College Major or Field of Study by FFA Membership

	FFA Member (n=60)		Non-FFA Member (n=109)		
	M	*SD*	*M*	*SD*	*t*
Choice of Major or Field of Study	3.22	1.58	2.82	1.36	1.79

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participant choice of major or field of study by 4-H membership is displayed in Table 26. The mean for 4-H members (M=3.27) was the highest. An independent samples t test was performed on the means. The mean influence of the VGSA on major or field of study for 4-H members (M=3.27, SD=1.45) is not statistically significantly different (t=1.81, *df*=176, p=.072) from non-4-H members (M=2.83, SD= 1.43).

Table 26

The Perception of the Influence of the VGSA on Alumni Choice of College Major or Field of Study by 4-H Membership

	4-H Member (n=48)		Non-4-H Member (n=120)		
	M	*SD*	*M*	*SD*	*t*
Choice of Major or Field of Study	3.27	1.46	2.82	1.41	1.88

Note. Scale of 1=No Influence, 5=Much Influence

Perception of the VGSA Influence on Career Goals

Question 25 for those enrolled in high school students and question 47 for those who have graduated from high school, asked the students what influence the VGSA had on their career goals. This was a Likert-type question with one being no influence and 5 being much influence. The mean score for the entire sample (n=176) was 2.48 with a standard deviation of 1.46. The number of alumni who responded that the VGSA had much influence (5) was 18, while 56 responded that the VGSA had no influence (1). The influence of the VGSA on career choice was lower than the influence on college and major choices. This section examines the perception of the influence of the VGSA on alumni career goals.

A list of career goals of VGSA alumni who enrolled in high school is located in Appendix L. Career goals for students who have completed high school are located in Appendix M. For students who had not completed high school, 18 students indicated medicine or a related field as their future career. This was the highest frequency of any choice. Undecided (14) and veterinary medicine (12) were second and third respectively. Sixteen students indicated that their career goals included an area of agriculture, natural resources, or science.

For students who had completed high school, the number of students who were undecided was much smaller than their high school counterparts (5). Medicine or a medical related field was the top choice of these students (20). Veterinary medicine was the second highest choice (12). Twenty-five of the students responded that an agricultural, science, or natural resources related field was their career goal. It is interesting to note that of those students who have completed high school, five said that

they want to be an agricultural teacher. This was the highest frequency of the specific agricultural careers. Agricultural and Extension Education is the department at Virginia Tech that houses the VGSA.

The perception of the influence of the VGSA on participants' career goals by current status is displayed in Table 27. High school students (M=2.63) had the highest mean. An independent-samples t test was performed on the two means. The mean perception of the influence of the VGSA on career goals for current high school students (M=2.63, SD=1.37) is not statistically significantly different (t=1.35, *df*=174, p=.179) from non-high school students (M=2.36, SD= 1.30).

Table 27

The Perception of the Influence of the VGSA on High School Students' and High School Graduates' Career Goals

	High School Students (n=81)		High School Graduates (n=95)		
	M	*SD*	*M*	*SD*	*t*
Choice of major or field of study	2.63	1.37	2.36	1.30	1.35

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participants' career goals by year is presented in Table 28. The classes with the highest means were 2003 and 2004 (M=2.24). An ANOVA test was performed on the means. With a F value of .84 with *df* 3, 172 at a significance level of .05, VGSA year does not have a statistically significant influence on career goals.

Table 28

The Perception of the Influence of the VGSA on Alumni Goals by Year

	2001 (n=25)		2002 (n=38)		2003 (n=48)		2004 (n=65)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of major or field of study	2.24	1.27	2.29	1.23	2.60	1.33	2.60	1.42	0.84

Note. Scale of 1=No Influence, 5=Much Influence. F=.84, *df* =3, 172, p<.05

Table 29 displays the perception of the influence of the VGSA on participants' career choice by gender. Female students (M=2.56) had the highest mean. An independent samples t test was performed on the means. The mean influence of the VGSA on career choice for male students (M= 2.34, SD=1.35) is not statistically significantly different (t=1.06, *df*=174, p=.292) from female students (M=2.56, SD=1.32).

Table 29

The Perception of the Influence of the VGSA on Alumni Career Goals by Gender

	Male Students (n=62)		Female Students (n=114)		
	M	*SD*	*M*	*SD*	*t*
Choice of major or field of study	2.34	1.35	2.56	1.32	1.06

Note. Scale of 1=No Influence, 5=Much Influence

In Table 30, the perception of the influence of the VGSA on participant career choice by home community is displayed. Students from rural and small towns had the highest mean (M=2.65). An ANOVA analysis was performed on this data. With an F

value of .31 with *df* 3, 170 at a significance level of .05, perception of the influence of the VGSA on career goals was not different when comparing size of home community.

Table 30

The Perception of the Influence of the VGSA on Alumni Career Goals by Participants' Home

	Farm (n=37)		Small Town (n=26)		Small Urban (n=44)		Urban (n=67)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of Major or Field of Study	2.41	1.30	2.65	1.29	2.36	1.28	2.52	1.43	0.31

Note. Scale of 1=No Influence, 5=Much Influence. F=.31, *df* =3. 170, p<.05

The perception of the influence of the VGSA on participants' choice of career by race/ethnicity is displayed in Table 31. Black students had the highest mean (M=2.86). The means were compared using an ANOVA analysis. With an F value of .22 with *df* 3, 172 at a significance level of .05, the perception of the influence of the VGSA on career goals was not different when comparing race/ethnicity.

Table 31

The Perception of the Influence of the VGSA on Career Goals by Participants' Race/Ethnicity

	n	*M*	*SD*
White (Not Hispanic)	144	2.48	1.35
Black (Not Hispanic)	7	2.86	1.57
Asian/Pacific Islander	22	2.41	1.22
Unknown/Unspecified	3	2.33	1.53

Note. Scale of 1=No Influence, 5=Much Influence. F=.22, *df* =3, 172, p<.05

The perception of the influence of the VGSA on alumni career goals by VGSA major is presented in Table 32. As mentioned earlier, students are not guaranteed their first choice of major. Veterinary Medicine students had the highest mean (M=2.87) while Food Science had the lowest (M=2.20). With an F value of .75 with *df* 5, 170 at a significance level of .05, VGSA major does not have a statistically significant influence on career goals.

Table 32

The Perception of the Influence of the VGSA on Alumni Career Goals by Participants' VGSA Major

	n	*M*	*SD*
Veterinary Medicine	30	2.87	1.53
Animal Science	33	2.52	1.15
Agricultural Economics	30	2.47	1.28
Natural Resources	26	2.38	1.36
Plant Science	37	2.38	1.36
Food Science	20	2.20	1.36

Note. Scale of 1=No Influence, 5=Much Influence. F=.75, *df* =5, 170, p<.05

Table 33 displays the perception of the influence of the VGSA on alumni choice of career by FFA membership. Students who were members of the FFA had a higher mean (M=2.54) than students who were not members (M=2.43). An independent samples t test was used to analyze the means. The mean influence of the VGSA on career goals for FFA members (M=2.43, SD=1.38) is not statistically significantly different (t=.53, *df*=173, p=.596) from non-FFA members (M=2.43, SD= 1.30).

Table 33

The Perception of the Influence of the VGSA on Alumni Career Goals by FFA Membership

	FFA Member (n=63)		Non-FFA Member (n=112)		
	M	*SD*	*M*	*SD*	*t*
Choice of Major or Field of Study	2.54	1.38	2.43	1.30	0.53

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participants' career choice by 4-H membership is displayed in Table 34. Students who were 4-H members had a higher mean (M=2.59) than students who were non-members (M=2.41). The mean influence of the VGSA on career goals for 4-H members (M=2.59, SD=1.27) is not statistically significantly different (t=.76, *df*=172, p=.449) from non-4-H members (M=2.41, SD= 1.34).

Table 34

The Perception of the Influence of the VGSA on Alumni Career Goals by 4-H Membership

	4-H Member (n=46)		Non-4-H Member (n=128)		
	M	*SD*	*M*	*SD*	*t*
Choice of Major or Field of Study	2.59	1.27	2.41	1.34	0.76

Note. Scale of 1=No Influence, 5=Much Influence

Perception of the VGSA Influence on Knowledge and Perception of Agriculture

Question 49 asked all alumni what influence the VGSA had on each student's knowledge and perception of agriculture. This was a Likert-type question with one being

no influence and 5 being much influence. The mean score for the entire sample (n=179) was 4.19 with a standard deviation of 0.93. The number of alumni who responded that the VGSA had much influence (5) was 84, while 4 responded that the VGSA had no influence (1).

The perception of the influence of the VGSA on participants' knowledge and perception of agriculture by current status is displayed in Table 35. It is interesting to note that the influence was higher for high school students (M=4.43) than non-high school students (M=3.99). An independent-samples t test was performed on the two means. The mean effect of the VGSA on the perception of the influence on knowledge and perception of agriculture for current high school students (M= 4.43, SD=0.81) is statistically significantly higher (t=3.23, *df*=177, p=.001) from non-high school students (M=3.99, SD= 0.99).

Table 35

The Perception of the Influence of the VGSA on High School Students' and High School Graduates' Knowledge and Perception of Agriculture

	High School Students (n=81)		High School Students (n=98)		
	M	*SD*	*M*	*SD*	*t*
Choice of major or field of study	4.43	0.81	3.99	0.99	3.23

Note: Scale of 1=No Influence, 5=Much Influence

The influence of the VGSA on participants' knowledge and perception of agriculture by year is presented in Table 36. It is interesting to note that the 2004 class (M=4.46) had the highest influence, while 2001 (M=3.92) had the lowest. An ANOVA test was performed on the means. With an F value of 3.15 with *df* 3, 175 at a significance

level of .05, VGSA year does have a statistically significant influence on the perception of the knowledge and perception of agriculture. After performing a Tukey HSD post hoc test on SPSS, significant differences were found between the class of 2001 and 2004, the class of 2002 and 2004, and the class of 2003 and 2004.

Table 36

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by VGSA Year

	2001 (n=26)		2002 (n=40)		2003 (n=48)		2004 (n=65)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of major or field of study	3.92	1.13	4.05	0.88	4.08	1.07	4.46	0.71	3.15

Note. Scale of 1=No Influence, 5=Much Influence. F=3.15, *df* =3, 175, p<.05

Table 37 displays the perception of the influence of the VGSA on participants' knowledge and perception of agriculture by gender. Female students had a higher mean (M=4.23) than males (M=4.10). An independent samples t test was performed on the means. The mean of the perception of the influence of the VGSA on knowledge and perception of agriculture for male students (M= 4.10, SD=1.05) is not statistically significantly different (t=0.97, *df*=177, p=.333) from female students (M=4.24, SD= 0.87).

Table 37

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by Gender

	Male Students (n=62)		Female Students (n=117)		*t*
	M	*SD*	*M*	*SD*	
Choice of major or field of study	4.10	1.05	4.24	0.87	0.97

Note. Scale of 1=No Influence, 5=Much Influence

In Table 38, the perception of the influence of the VGSA on participant knowledge and perception of agriculture by home community is displayed. It is interesting to note that the VGSA had the highest influence on students from urban areas with populations over 20,000 (M=4.48). An ANOVA analysis was performed on this data. With an F value of 7.91 with *df* 3, 173 at a significance level of .05, home community does have a statistically significant effect on perception of the influence of the VGSA on alumni knowledge and perception. After performing a Tukey HSD post hoc test on SPSS, significant differences were found between the farm students and all other categories of residence and students from small town/rural and students from urban areas.

Table 38

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by Participants' Home

	Farm (n=38)		Small Town (n=26)		Small Urban (n=44)		Urban (n=69)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
Choice of Major or Field of Study	3.63	0.97	4.04	1.04	4.30	0.79	4.48	0.83	7.91

Note. Scale of 1=No Influence, 5=Much Influence. F=7.91, *df* =3, 173, p<.05

The perception of the influence of the VGSA on participants' knowledge and perception of agriculture by race/ethnicity is displayed in Table 39. Asian students had the highest mean (M=4.50) and White students had the lowest (M=4.13). The means were compared using an ANOVA analysis. With an F value of 1.31 with *df* 3, 175 at a significance level of .05, race/ethnicity does not have a statistically significant impact on the perception of the VGSA on knowledge and perception.

Table 39

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by Participants' Race/Ethnicity

	n	*M*	*SD*
White (Not Hispanic)	147	4.13	0.97
Black (Not Hispanic)	7	4.29	0.95
Asian/Pacific Islander	22	4.50	0.60
Unknown/Unspecified	3	4.19	0.93

Note. Scale of 1=No Influence, 5=Much Influence. F=1.31, *df* =3, 175, p<.05

The perception of the influence of the VGSA on alumni knowledge and perception of agriculture by VGSA major is presented in Table 40. It should be noted that Plant Science students showed the highest mean (M=4.38), while Animal Science was the lowest (M=4.00). An ANOVA analysis was used to compare the means. With a F value of .82 with *df* 5, 173 at a significance level of .05, VGSA major does not have a statistically significant effect on the perception of the influence on knowledge and perception of agriculture. It should be remembered that students are not guaranteed their first choice of VGSA major.

Table 40

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by Participants' VGSA Major

	n	*M*	*SD*
Plant Science	37	4.38	0.76
Food Science	20	4.35	1.04
Agricultural Economics	31	4.23	0.92
Natural Resources	27	4.15	1.06
Veterinary Medicine	30	4.07	0.87
Animal Science	34	4.00	1.02

Note. Scale of 1=No Influence, 5=Much Influence. F=.82, *df* =5, 173, p<.05

Table 41 displays the perception of the influence of the VGSA on alumni knowledge and perception of agriculture by FFA membership. Students who were non-members of the FFA reported a higher influence (M=4.39) than students who were members (M=3.83). An independent samples t test was used to analyze the means. The mean of the perception of the influence of the VGSA on knowledge and perception of agriculture for FFA members (M=3.83, SD=1.07) is statistically significantly lower (t=3.96, *df*=175, p=.000) than non-FFA members (M=4.39, SD= 0.79).

Table 41

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by FFA Membership

	FFA Member (n=63)		Non-FFA Member (n=114)		
	M	*SD*	*M*	*SD*	*t*
Choice of Major or Field of Study	3.83	1.07	4.39	0.79	3.96

Note. Scale of 1=No Influence, 5=Much Influence

The perception of the influence of the VGSA on participants' knowledge and perception of agriculture by 4-H membership is displayed in Table 42. It is interesting to note that the influence was higher for non-4-H members (M=4.36) than members (M=3.73). An independent samples t test was performed on the means. The mean of the perception of the influence of the VGSA on knowledge and perception of agriculture for 4-H members (M=3.73, SD=1.07) is statistically significantly lower (t=4.14, *df*=174, p=.00) than non-4-H members (M=4.36, SD= 0.83).

Table 42

The Perception of the Influence of the VGSA on Alumni Knowledge and Perception of Agriculture by 4-H Membership

	4-H Member (n=48)		Non-4-H Member (n=128)		
	M	SD	M	SD	t
Choice of Major or Field of Study	3.73	1.07	4.36	0.83	4.14

Note. Scale of 1=No Influence, 5=Much Influence

Summary

This chapter has provided a presentation of the findings as they relate to the purpose and specific objectives of the study. Statistical data which included frequencies, means, and standard deviations are presented. Results from specific tests used for the analysis of those statistics are also presented in the findings. Statistical significance was found for the influence of the VGSA on alumni knowledge and perception of agriculture in relationship to student's current status (either high school student or high school graduate), VGSA year, home community, FFA membership, and 4-H membership.

Chapter 5

Summary, Conclusions, and Recommendations

This chapter contains a summary of the problem, objectives, review of literature, and the research methodology for this study. There is also a discussion of conclusions and recommendations from the findings.

Problem

The agricultural industry has and continues to evolve into something that is much different from 100 or even 10 years ago. Farmers no longer make up a significant portion of the national population nor the agricultural employment population. Those involved in production agriculture comprise only 2% of the population (U.S. Census Bureau, n.d.a). Technological advances have led to increased production and efficiency of American farms (Shelley-Tolbert, Conroy, & Dailey, 2000). Even though the agricultural industry requires fewer farmers, a steady supply of well-trained and highly-educated professionals is needed to insure success (Betts & Newcomb, 1986; Edwards, Leising, & Parr, 2002). Employment opportunities in agriculture and natural resources are expected to remain strong in the future. Approximately 22 million Americans are employed in the agricultural industry (National FFA Organization, 2004).It is projected that demand for qualified college graduates to fill agricultural jobs will exceed the supply (Goecker, Gilmore, Smith, & Smith, 2005).

Because of the evolution of the industry, the agricultural education profession has had to make changes. In the benchmark report of the National Research Council (NRC) (1988), systematic changes were recommended to change the nature of agricultural

education. It was recommended that new agricultural education curricula be developed to provide students with the opportunity prepare for highly skilled careers that required scientific and leadership training. Since the late 1980s, numerous programs have integrated science into the agricultural curriculum to meet the recommendations of the NRC and to help prepare students for the important and diverse careers in agriculture (Edwards, et al. 2005; Shelley-Tolbert, et al, 2000). The Virginia Governor's School for Agriculture (VGSA) is one of the programs conceived to attract gifted and talented students in order to expose those students to the diversity of the agricultural industry.

Purpose and Objectives

The specific objectives of this study were to:

1. Determine demographic and other characteristics of the Virginia Governor's School for Agriculture alumni;
2. Determine the alumni perception of the influence of the Virginia Governor's School for Agriculture on participants' choice of institution for post-secondary education;
3. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' choice of major or field of study;
4. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' career goals; and
5. Determine the alumni perception of the influence the Virginia Governor's School for Agriculture has on participants' knowledge and perception of the agricultural industry.

Summary of Literature

Students with a positive perception and a high degree of knowledge will be more likely to pursue a degree and career in agriculture. By analyzing one's beliefs about

agriculture, a prediction can be made as to whether that person will pursue study or a career in the industry (Dyer, Breja, & Andreasen, 1999).

In the late 1970s and early 1980s as farming in America fell upon hard times, the image of agriculture was not pleasant (Coulter, 1985). Students were developing a negative perception and lack of knowledge of agriculture (Hoover & Houser, 1991). As a result, enrollments in colleges of agriculture fell (Coulter, 1985). In the late 1980s, the NRC (1988) presented its benchmark report recommending changes in agricultural education. The report recommended that students receive a meaningful education at an early age, so that they will develop positive images of agriculture. The industry would benefit from highly agricultural literate students (NRC, 1988).

Programs have been developed with the goal of increasing the agricultural literacy of gifted and talented students. Gifted and talented students are defined by the Virginia Department of Education as those students "whose abilities and potential for accomplishments are so outstanding that they require special educational programs to meet their needs" (Virginia Department of Education, n.d.b, n.p.). Enrichment programs provide gifted and talented students with curriculum that has been modified or added to in order to provide the student with a richer experience (Davis & Rimm, 1994; Howley, Howley, & Pendarvis, 1986; Schiever & Maker, 1998). The VGSA provides a curriculum that students are not exposed to in their high schools.

Summer enrichment programs, which include the VGSA, are needed because schools have failed to provide for gifted and talented students (Olszewki-Kubilius, 1997). Successful programs besides the VGSA from throughout the country include the Purdue Academic Leadership Program in Indiana, the University for Youth in Colorado, and the Pennsylvania Governor's School for Agricultural Sciences (PGSAS) (Feldhusen &

Clinkenbeard, 1982; Purdue University, 2004; Seeley, Katz, & Linder, 1981). The PGSAS has been a model for the VGSA.

The PGSAS was developed as to meet the demand for agricultural scientists and professionals (Houser & Baker, 1991). Students who have participated in the PGSAS have shown an increase in knowledge and perception of agriculture (Hoover & Houser, 1991; Nordstrom, et al., 1999; Nordstrom, et al., 2000). Because of the PGSAS experience, students have made decisions to attend a college of agriculture, most notably Penn State, and to pursue careers in agriculture.

Previous research on the VGSA has found that students have shown some increase in knowledge and perception after completion of the school (Duncan & Broyles, 2004). The VGSA has been developed as an enrichment tool to increase the knowledge and perception of the agricultural industry. In the long run, it is hoped that through exposure to agriculture during the VGSA program, students will be influenced to seek further study of agriculture in college and to pursue a career in the field.

Research Methodology

This study used a descriptive design. A mail survey was developed that provided descriptive data that would seek to answer the objectives of the study. The instrument was developed using procedures recommended by Dillman (2000). The instrument was developed with the assistance of experts from the Virginia Tech Department of Agricultural and Extension Education. A group of seven Virginia Tech Agricultural Education students; five Christiansburg, Virginia high school students; and five Avon, Illinois high school students participated in the development of the instrument as the pilot groups. The instrument consisted of items to gather demographics and characteristics of

the VGSA alumi, and Likert-type items to determine alumni perception of the VGSA's influence alumni onchoice of college, major, and career. There was also a Likert-type item to determine the alumni perception of the VGSA's impact on alumni knowledge and perception of the agricultural industry.

The instruments were mailed to the VGSA alumni in early January, 2005. Follow-up correspondence in various forms was sent to students at intervals through late February. Survey procedures described by Dillman (2000) were used as a guide.

The sample for this study was the entire VGSA population (N=316). Of the instruments that were mailed, 11 were returned by the postal service. This resulted in an accessible population of 305. The number of instruments that were completed was 182 (57.6%). A follow-up phone survey was conducted with 10 randomly selected non-reponders. The data from the 10 non-responders was combined with 20 late responders to determine non-response error. It was found that no significant difference existed between the sample and the non-responder/ late responder group.

Statistical analysis using SPSS 13.0 for Windows Student Version was conducted on the data. In order to measure demographic information, frequencies were used as the statistical measure. Means and standard deviations were used to measure statistically the impact of the VGSA on students' choice of institution, major, career, knowledge, and perception. Means were compared with t tests and Analysis of Variance (ANOVA). A number of variables were examined, and for most variables no significant statistical differences were found.

Conclusions and Discussion

Demographics

The typical VGSA student is a white female hailing from an urban area with a population greater than 20,000. This student has a high school GPA of 3.93 and is in the top 6% of her high school graduating class. She has an SAT math score of 627 and an SAT verbal score of 630. She is not a member of the FFA or 4-H. The typical VGSA student provides a picture of the VGSA. The VGSA is exposing students to agriculture who are not familiar with the industry or the careers available in the industry.

The numbers and proportions of students from urban areas have increased each year of the VGSA. Even though the number of farm and rural students has remained consistent for the four schools, the portion of these students has dramatically dropped. The same is true of students who are members of the FFA and 4-H.

The National Research Council (1988) recommended changes in agricultural education, including the curriculum, to increase the agricultural literacy of all students. The VGSA is reaching students who would not be exposed to the diverse industry of agriculture in their high schools.

Alumni respondents were overwhelmingly white students. Black and Hispanic students represent a small portion of the VGSA alumni. A small number of Black students responded to the instrument, and no Hispanic students participated in the study. The number of Asian students has increased each year of the VGSA.

College Choice

From the findings, the VGSA on average does not have an overwhelming influence on alumni choice of post-secondary institution. However, 56 VGSA alumni

were enrolled at Virginia Tech. Virginia Tech had by far the most alumni enrolled, and it was the dominant choice of alumni who had not completed high school. Four weeks is a short period of time to convince students to attend a particular institution with the notions that students bring with them from their home, community, and school. The VGSA provides exposure to potential students for Virginia Tech that is not available to those who do not participate in the program.

Choice of Major

As with choice of college, the VGSA on average did not provide an overwhelming influence on student choice of college major or field of study. A very diverse selection of college majors was reported by the alumni. Almost one quarter of the respondents reported that the VGSA had no influence on their choice of major or field of study. However, there were a number of alumni (35) for which the VGSA provided much influence. As with college choice, the VGSA provides students with exposure to the many fields of study in agriculture. Gifted and talented students who do not participate in the program do not receive this exposure. Virginia Tech and the College of Agriculture and Life Sciences benefit from the exposure provided by the VGSA. Other institutions that provide agricultural disciplines could also benefit from this exposure, as not all VGSA alumni attend Virginia Tech.

Career Goals

The VGSA had even less influence on career goals than it did on college and major choices. A number of students (56) responded that the program had no influence on their career goals. However, a small number (18) believed that the VGSA had much

influence on career goals. Students are exposed to different careers before they attend the VGSA. Student career plans are also influenced by other factors such as parents, teachers, and peers that may affect career goals. The four week VGSA may not provide significant exposure to have much influence over student career plans. But, the VGSA does provide exposure that may lead alumni to an agricultural career later in life.

Knowledge and Perceptions

The data showed that VGSA alumni held the perception that the program had a high level of influence on student knowledge and perception. Almost half of the respondents believed that the VGSA had much influence on their knowledge and perception of agriculture. This was particularly true of students who do not have a traditional agriculture background. The VGSA had higher influence on the knowledge and perception of urban students, non-FFA members, and non-4-H members, than it had on students with traditional agricultural backgrounds. The VGSA was implemented to increase the agricultural literacy of gifted and talented students. It was envisioned as a tool to expand student knowledge and raise perception of agriculture. The findings of this study suggest that the VGSA through it is exposure to agriculture is succeeding in achieving this goal.

Recommendations

From the findings and conclusions of this study, numerous recommendations arise. As reported in the findings, white students represented the vast majority of alumni. It is recommended that efforts should be made to increase participation by

underrepresented populations such as Black and Hispanic gifted and talented students. Many of these students are not exposed to agriculture in their high schools.

Efforts should be made to ensure that students from traditional agricultural backgrounds continue to participate in the VGSA. The VGSA provides exposure to areas of agriculture that these students might not have in their home schools. The VGSA also provides these students with exposure to students with backgrounds and experiences different from their own.

The College of Agriculture and Life Sciences at Virginia Tech should continue to use the VGSA as a recruitment tool. The VGSA provides students with exposure to Virginia Tech and the College that they would not receive had they not participated in the program. The VGSA should be used as a recruitment tool in consultation with college and university officials on how to best recruit gifted and talented students.

Along the same lines as the previous recommendation, departments representing agricultural majors in the College of Agriculture and Life Sciences should also use the VGSA as a recruitment tool. The VGSA provides exposure to the different majors and members of the faculty of those majors. The departments should seek advice from college and university officials on how to best recruit gifted and talented students.

The VGSA through curriculum and activities provides exposure to agricultural careers. The VGSA should continue to show students career paths in agricultural related fields and the associated majors. Students are exposed to the diverse agricultural industry which is not available in many of the students' schools.

The VGSA has had much influence on alumni knowledge and perception of the agricultural industry. Students are exposed to agriculture in ways that are not available in

their schools and home communities. The VGSA should continue the successful work at enhancing the knowledge and perception of the VGSA participants.

The VGSA has successfully enhanced the knowledge and perception of the agricultural industry. Results of this study should be shared with Virginia stakeholders such as the Virginia Department of Agriculture and Consumer Services, the Virginia Agribusiness Council, and the Virginia Farm Bureau. Also, results of this study should be shared with states that have a Governor's School for Agriculture, or are considering establishment of a similar program. The results can be used to compare programs that are currently being conducted across the country. Because of its success, the VGSA can also be used as a model for other states and programs.

Based on the success of the VGSA, the Virginia Department of Education (VDOE) should continue the program. The VDOE can use the results of this survey to compare the VGSA to other Virginia Governor's School programs.

Finally, based on the success of the program, the College of Agriculture and Life Sciences and the Department of Agricultural and Extension Education at Virginia Tech should continue to house the VGSA. As mentioned earlier, students receive exposure that they would not receive had they not participated in the program. One could also argue that the VGSA is a service component of the Land Grant Mission.

Recommendations for Further Research

Based on the findings and conclusions of this study, there are numerous recommendations for further research. Studies should be conducted to determine how to attract more Black and Hispanic students.

From the findings, there is a perception that the VGSA has an influence on participants' choice of college and college major. It is recommended that a more in depth study be conducted to determine how and why VGSA students select a college and field of study. Pre and post-VGSA surveys should be conducted to determine the true nature of the influence of the VGSA on choice of college and major. Similarly, research should be conducted to explore the relationship between the VGSA and participant career goals. VGSA alumni had the perception that the VGSA was influential career goals, further research should explore this further.

The findings show that VGSA alumni perceive that the program has an influence on knowledge and perception of the agricultural industry. Researchers should continue to use pre and post-test surveys to measure the knowledge and perception of the VGSA participants in order to determine a more precise picture of the influence of the VGSA on student knowledge and perception of the agricultural industry.

It is recommended that the data set for this study be used for further research. Data is available to perform regression analysis using alumni perceptions of the influence of the VGSA on college major, and career choice as the dependent variable. A regression analysis of alumni perception of influence of the VGSA on knowledge and perception of agriculture can also be used as a dependent variable. The data for demographic information and other characteristics can provide independent variables for a regression study.

Finally, the VGSA has been a successful tool in exposing gifted and talented students from throughout Virginia to agriculture. Further research should be conducted to find innovative methods to improve upon the success of the school.

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Appendix A

Request for Exemption of Research Involving Human Subjects
[please print or type responses below]

Principal Investigator (Faculty or Faculty Advisor and primary contact): John G. Cannon

Co-Investigators(Faculty or Student) John Hillison

Department(s):Agricultural and Ext. Ed Mail Code: 0343 E-mail:jocanno1@vt.edu Phone:1-5717

Project Title: Effects of Gov. School for Ag on Students College and Career Choices # of Human Subjects 321

Source of Funding Support: x Departmental Research ____ Sponsored Research (OSP No.:_____)

[x] All investigators of this project are qualified through completion of the formal training program or web-based training programs provided by the Virginia Tech Office of Research Compliance.

***Note*:** To qualify for Exemption, the research must be (a) of minimal risk to the subjects, (b) must not involve any of the special classes of subjects, and (c) must be in one or more of the following categories. A full description of these categories may be found in the Exempt Research section of the Virginia Tech "*IRB Protocol Submission Instructions Document* or in the federal regulations [45 CFR 46.101(b)(1-6)]. (http://ohrp.osophs.dhhs.gov/humansubjects/guidance/45cfr46.htm#46.101)

Please mark/check the appropriate category or categories below which qualify the proposed project for exemption:

[ ] 1. Research will be conducted in established or commonly accepted educational settings, involving normal educational practices [see item (1), page 6 of the "Instructions" document].

[x] 2. Research will involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, **unless** the subjects can be identified directly or through identifiers linked to the subjects **and** disclosure of responses could reasonably place the subjects at risk or criminal or civil liability or be damaging to the subjects' financial standing , employability or reputation [see item (2), page 6 –"Instructions"].

[ ] 3. Research will involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under item 2) above **if** the subjects are elected or appointed public officials or candidates for public office; **or** Federal statute(s) require(s) that the confidentiality or other personally identifiable information will be maintained [see item (3), page 6 of the "Instructions" document].

[ ] 4. Research will involve the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified directly or through identifiers linked to the subjects [see item (4), page 7 of the "Instructions" document].

[ ] 5. Research and demonstration projects designed to study, evaluate, or otherwise examine public benefit or service programs, procedures for obtaining benefits or proposed changes in such programs [see item (5), page 7 of the "Instructions" document].

[ ] 6. Taste and food quality evaluation and consumer acceptance studies [see item (6), page 7 - "Instructions].

	John G. Cannon	
Investigator(s)	Print name	Date
Departmental Reviewer	Print name	Date
Chair, Institutional Review Board		Date

Appendix B

Cover Letter

January 6, 2005

Dear Virginia Governor's School for Agriculture Alumni:

It is our hope that this letter finds you well. The purpose of this letter is to ask for your assistance in determining future programming for the VGSA. We are conducting a research project to determine the impact of the Governor's School on alumni decisions regarding choices of college/university, college major, and career goals.

Please take 15 minutes to complete the enclosed and return in the envelope that we have provided. Your answers will be kept confidential and will only be reported as a whole for research purposes. No student will be identified in the research findings. If you are under the age of 18, a parent or guardian must sign the enclosed consent form. There is also a place for students who are under 18 to sign.

If you have any questions or concerns, please feel free to contact John Cannon at (540)320-1438 or email him at jocanno1@vt.edu.

Thanks for your assistance.

Sincerely,

Thomas W. Broyles
Director

John Cannon
Assistant Director

Appendix C

Instrument

Virginia Governor's School for Agriculture
Alumni Survey

This survey is designed to determine the impact of the Virginia Governor's School for Agriculture on the students who have completed the school. Please complete the following questions to the best of your ability. The survey will take approximately 15 minutes to complete. Your answers will be kept confidential and used only for research purposes.

All Governor's School Alumni, please complete questions 1-6.

1. What year did you participate in the Governor's School for Agriculture as a scholar?
   2001 2002 2003 2004
2. What was your Governor's School for Agriculture major? (Circle One)
   Agricultural Economics Animal Science Food Science
   Natural Resources Plant Science Veterinary Medicine
3. What is your current age? _____
4. What is your race/ethnicity? (Circle One)
   Native Hawaiian White (Not Hispanic) Hispanic
   Black (Not Hispanic) Asian/Pacific Islander American Indian/Alaskan Native
   Unknown/Unspecified
5. What is your gender?
   Male Female
6. Which of the following best describes your home community? (Circle One)
   Farm
   Small Town/Rural (Population less than 5,000)
   Small Urban (Population of 5,000-20,000)
   Urban (20,000 and over)

If you are currently in high school, please go to page 2 item 7.
If you have graduated from high school, please go to page 3 item 26.

Current High School Students

Please complete questions 7 through 26 if you are currently a high school student.

7. What high school do you currently attend? _____

8. How many students currently attend grades 9-12 at your high school? _____

9. What is your grade point average? _____ What scale does your high school use? _____

10. What is your class rank? _____out of _____ members of your class

11. Among the following standardized tests, which is the most recent that you have completed?

PSAT SAT ACT Not Applicable (NA)

12. What was your score? PSAT or SAT Math _____ Verbal _____ ACT Composite _____

13. What is the number of advanced placement, international baccalaureate, accelerated, and honors courses that you will have completed including those in which you are currently enrolled? _____

14. How many high school agricultural education classes have you completed or are currently enrolled? _____

15. Are you or were you an FFA member? Yes No If yes, how many years have you been or were you a member? _____

16. Are you or were you a 4-H member? Yes No If yes, how many years have you been or were you a member? _____

17. What do you plan to do immediately after graduation from high school? (Circle One)

College/University Military Employment Other

18. If your response to item 17 is employment or other, please explain.

_____

19. If the response to item 17 is other than college/university, do you plan to attend a college or university in the future? Yes No

20. What college/university do you plan to attend after graduation or in the future?_____

21. To what extent did the Governor's School for Agriculture influence your choice of college/university? Please rate on a scale of 1 to 5 with 1 being no influence and 5 being much influence.

No Influence Much Influence

1 2 3 4 5

Please explain. _____

22. What college major do you plan to pursue? _____

23. To what extent did the Governor's School for Agriculture influence your choice of major?

No Influence Much Influence

1 2 3 4 5

Please explain. _____

24. What do you plan to pursue as a career? _____

25. To what extent did the Governor's School for Agriculture influence your choice of career?

No Influence Much Influence

1 2 3 4 5

Please explain._____

Please continue to item 49.

High School Graduates

Please complete items 26 through 48 if you have graduated from high school.

26. From what high school did you graduate? _____
27. How many students attended grades 9-12 at your high school? _____
28. What year did you graduate from high school? _____
29. What was your final grade point average? _____
    What scale was used by your high school_____
30. What was your final high school class rank? _____ out of _____ students
31. Which of the following standardized tests did you complete most recently?
    PSAT SAT ACT Not Applicable (NA)
32. What was your score? PSAT or SAT Math _____ Verbal _____ ACT Composite _____
33. How many advanced placement, international baccalaureate, accelerated, and honors courses did you complete in high school? _____
34. How many agricultural education classes did you complete in high school? _____
35. Were you an FFA member? Yes No If yes, for how many years? _____
36. Were you a 4-H member? Yes No If yes, for how many years? _____
37. Which best describes your current status? (Circle One)
College/University Military Full-time Employment Other
38. If your response to the previous item was employment or other, please explain.
    _____
39. If you are not currently enrolled in a college or university, do you plan to attend in the future?
    Yes No
40. What university or college are you currently enrolled in or do you plan to enroll in the future?
    _____
41. What is your academic level? (Circle)
    Freshman Sophomore Junior Senior NA
42. If currently enrolled, what is your university Grade Point Average on a 4.0 scale? _____
43. What degree are you currently pursuing? Associates Bachelors NA
44. To what extent did the Governor's School for Agriculture influence your current or future choice of university/college? Please rate on a scale of 1 to 5 with 1 being no influence and 5 being much influence.

No Influence				Much Influence
1	2	3	4	5

Please explain _____
45. What college major do you plan to pursue? _____
46. To what extent did the Governor's School for Agriculture influence your choice of major?

No Influence				Much Influence
1	2	3	4	5

Please explain _____

Please continue to, item 47.

High School Graduates (Continued)

47. What do you plan to pursue as a career? _____

48. To what extent did the Governor's School for Agriculture influence your choice of career?

No Influence				Much Influence
1	2	3	4	5

Please explain _____

All Governor's School Alumni, please complete the following questions.

49. To what extent did the Governor's School for Agriculture influence your knowledge and perception of agriculture?

No Influence				Much Influence
1	2	3	4	5

Please explain _____
_____

50. What do you believe was the best part of the Governor's School for Agriculture?
_____
_____
_____
_____
_____

51. What would you recommend be changed about the Governor's School for Agriculture programming?
_____
_____
_____
_____
_____

52. In which area were you identified as gifted? _____

Your answers will help us to determine the impact of the Governor's School for Agriculture and assist in planning for future schools. All answers will be kept strictly confidential.
Thank you for your assistance.

Appendix D

Parent Permission Form/Student Assent Form

Parent/Guardian Permission Form

I give permission for my daughter/son (Name) _____ who is under the age of 18 to participate in the Virginia Governor's School for Agriculture's Alumni Survey. I understand that my child's participation is voluntary, and the answers to the survey will be used for research purposes.

_____ _____

Date **Signature of Parent**

Student Assent Form

To be completed by students under the age of 18.

By my signature, I agree to participate in the Virginia Governor's School for Agriculture Alumni Survey. I also understand that I will participate with the permission of a parent. I further understand that my participation is voluntary, and that the information that I provide will be used for research purposes.

_____ _____

Date **Signature of Student**

Appendix E

Post card follow-up

Dear Governor's School Alumni:

Recently a survey was sent to you concerning the Governor's School fo r Agriculture. We appreciate your time and energy if you have completed and returned the survey.

If you have not completed the survey, please take the time to assist us. Your answers are valuable, as we evaluate past GSA's and plan for the future. Your answers will be kept confidential. If you have not received the survey please contact John Cannon at (540) 231-5717, or email him at jocanno1@vt.edu.

Sincerely,

Thomas W. Broyles, DirectorJohn Cannon, Asst. Director

Appendix F

Final Follow-Up Letter

February 21, 2005

Dear Virginia Governor's School for Agriculture Alumni:

Recently a survey was sent to you concerning the Governor's School for Agriculture. The purpose of the survey is to evaluate the impact of the school. Many of you have returned the questionnaire, and for that we are grateful. Some of you may not have received the survey because our paths have not crossed in the mail. If you have not completed it, we have enclosed another copy of the survey. Please take 15 minutes to complete it and return in the enclosed envelope that we have provided. Your answers will be kept confidential and only be reported as a whole for research purposes. No student will be identified in the research findings. If you are under the age of 18, a parent or guardian must sign the enclosed consent form. There is also a place for students who are under 18 to sign.

This survey is very important to the future of the Governor's School for Agriculture. Your answers to the survey will help us to provide the best possible programming for the Governor's School for Agriculture. If you have any questions or concerns, please feel free to contact me at (540) 320-1438 or email at jocanno1@vt.edu.

Thanks for your assistance.

Sincerely,

John Cannon

Assistant Director

Appendix G

Table 43

High Schools Represented by VGSA Alumni

School	Frequency
Gar-Field	7
St. Stephen's & St. Agnes	5
Yorktown	5
Culpepper County	4
Forest Park	4
Glouchester	4
Spotswood	4
Stonewall Jackson	4
Thomas Jefferson	4
Tunstall	4
Laurel Park	3
Lee-Davis	3
Mount Vernon	3
Nelson County	3
Osbourn Park	3
Princess Anne	3
Abingdon	2
Albemarle	2
Alta Vista	2
Buffalo Gap	2
Fairfax	2
George C. Marshall	2
Gretna	2
H-B Woodlawn	2
Hickory	2
James Wood	2
John S. Battle	2
Lake Braddock	2
Lebanon	2
Lee	2
Lord Botetourt	2
Loudoun Valley	2
Millbrook	2
Oakton	2
Poquoson	2
Prince Edward	2
Radford	2
Robert E. Lee	2
Stone Bridge	2
Turner Ashby	2
Washington-Lee	2
West Potomac	2
Western Albemarle	2

Alleghany	1
Annandale	1
Bath County	1
Blacksburg	1
Bland	1
Bluestone	1
Brentsville	1
Brookville	1
C. D. Hylton	1
Carroll County	1
Castlewood	1
CD Hylton	1
Centerville	1
Central	1
Christiansburg	1
Clover Hill	1
Covington	1
Dinwiddie	1
Eastern Montgomery	1
First Colonial	1
Floyd County	1
Floyd E. Kellam	1
Fort Defiance	1
Franklin County	1
Giles	1
Halifax County	1
Hylton	1
Langley	1
Liberty	1
Louisa County	1
Luray	1
Maggie Walker Gov School	1
Magna Vista	1
McLean	1
Midlothian	1
Monticello	1
Nansemond Suffolk Academy	1
Norfolk Academy	1
North Stafford	1
Northwood	1
Ocean Lakes	1
Orange County	1
Osbourn	1
Potomac	1
Powhatan	1
Rockbridge	1
Rockbridge County	1

Rustburg	1
South Lakes	1
Southampton	1
Spotsylvania	1
St. Christopher's	1
St. Paul	1
Strasburg	1
Tallwood	1
Tazewell	1
Thomas A. Edison	1
Thomas Dale	1
Thomas Walker	1
Walrefield	1
Walsingham Acadmey	1
West Point	1
Westfield	1
William Monroe	1
Woodstock Central	1

Appendix H

Table 44

Colleges and Universities of Currently Enrolled VGSA Alumni

Institution	Frequency
VT	56
UVA	12
Cornell	3
VCU	2
Washington U (StL)	2
William & Mary	2
Berea	1
Blue Ridge CC	1
Duke	1
Ferrum	1
JMU	1
Lord Fairfax CC	1
Oberlin College	1
Old Dominion	1
Penn State	1
Pfeiffer	1
Radford	1
Randolph-Macon	1
Texas A&M	1
UMd Balt Co	1
University of Washington	1
US Naval Academy	1
UVA Wise	1
UW-Madison	1
Virginia Wesleyan	1
Wake Forest	1
Wilkes University	1

Appendix I

Table 45

Choice of College or University for Current High School Students

Institution
Air Force Academy
Amherst
Blue Ridge Community College
Boston College
Brown
Cornell
Duke
George Mason
Georgia Tech
Harvard
James Madison
John's Hopkins
King
McGill
Michigan State
MIT
Mountain Empire Community College
Naval Academy
New River Community College
North Carolina State
Princeton
Stanford
University of Kentucky
University of Pittsburgh
University of Virginia
Virginia Highlands Community College
Virginia Tech
Wake Forest
Washington & Lee
Wellesley
William & Mary
Yale

Appendix J

Table 46

Major or Field of Study of Currently Enrolled College/University VGSA Alumni

Major	Frequency
Animal Science	14
Biology	10
Agricultural Economics	6
Agricultural Education	4
Biochemistry	2
Business	2
Crop Science	2
Economics	2
Engineering	2
Food Science	2
Horticulture	2
Pre-Med	2
Aerospace Engineering	1
Ag Econ/An Sci	1
Anthropology	1
Bio Chemistry	1
Biochemistry/Ag Ed	1
Biology/Animal Science	1
Biology/Environmental	1
Biology/Spanish	1
Biology/Studio Art	1
Biomedical Engineering	1
Bio-medical Engineering	1
Business Administration	1
Chemical Engineering	1
Civil Engineering	1
CSES	1
CSES, Biotechnology Option	1
Early Childhood Education	1
Environmental Policy	1
Environmental Science & Policy	1
Environmental Studies/Biology	1
Exercise Science	1
Finance	1
Forestry	1
General Studies-Science	1
History	1
Human Nutrition Food and Exercise	1
Industrial & Systems Eng	1
Industrial Forestry Operations	1
International Studies	1
Mathematics	1
Mechanical Engineering	1

Mechanical Engineering/Finance	1
Medicine	1
Molecular Biology	1
Natural Resources conservation	1
Nursing	1
Nutrition	1
Parks, Recreation, Tourism	1
Pharmacy	1
Physics	1
Political Science	1
Pre-Dental	1
Pre-Med/Sports Med	1
Psychology	1
Science	1
Sociology	1
Sociology/English	1
Teaching/Learning	1
Undecided	1

Appendix K

Table 47

Future College Major of High School VGSA Alumni

Major	Frequency
Animal Science	8
Undecided	5
Biology	4
Engineering	3
Pre-Med	3
Pre-Vet	3
Ag Econ	2
Biochemistry	2
Biology/Pre-Med	2
Chemistry	2
Economics	2
Pharmacy	2
Political Science	2
Psychology	2
Ag & Nat Resources	1
Ag Ed or General Ed	1
Agriculture undecided	1
Agriculture/Horticulture	1
Architecture	1
Biochemistry/Psychology	1
Biologist/Geology	1
Biology or Environmental Science	1
Biology or Neuroscience	1
Biology or Pre-Vet	1
Biology/Genetics	1
Biology/medicine	1
Biomedical engineering	1
Broadcast Journalism	1
Business/English/Pre-Law	1
Chemical Engineer	1
Classics	1
Classics, Political Science, or Economics	1
Crop and Soil Science	1
CSES	1
CSES/International Ag	1
Dairy or Animal Science	1
Dairy Science	1
Electricity	1
Environmental Science and Public Policy	1
Environmental Engineering	1
Environmental Science	1
Forestry Science	1
Horticulture	1

International Relations and Environmental Science	1
Mass Communications	1
Math/Astrophysics	1
Medicine	1
Medicine/Aviation	1
Molecular Biology	1
Music Ed	1
Physics/Pre-Med	1
Pre-Medicine	1
Sociology	1

Appendix L

Table 48

Career Goals of High School VGSA Alumni

Career	Frequency
Medicine	14
Undecided	14
Vet	10
Engineering	3
Pharmacist	2
Psychologist	2
Advertising	1
Ag Ed	1
Ag Ed/Ag Extension	1
Agribusiness	1
Agriculture	1
Agronomist	1
Animal Science	1
Architect/Psychiatrist	1
Astronomer	1
Biology	1
Broadcaster	1
Economic Development	1
Electrician	1
Environmental Engineering	1
Equine/Livestock	1
Extension	1
Forensic Anthropology	1
Forestry	1
High School Teacher	1
Landscape Architect	1
Law/Journalism	1
Lawyer	1
Lawyer or Scientist	1
Medicine/Military	1
Military	1
Music Teacher	1
nanotechnology	1
optometry or pharmacist	1
Politics or Business	1
Research	1
Science	1
Soil Scientist	1
Vet, accountant, teacher	1
Vet/Farmer	1
Zoologist	1

Appendix M

Table 49

Career Goals of High School Graduates

Career	Frequency
Medicine	13
Vet	12
Ag Teacher	5
Undecided	5
Engineer	3
Teacher	3
Ag Extension Agent	2
Agri-business	2
Farmer	2
Military	2
Pharmaceuticals	2
Aerospace Industry	1
Ag Communications/Govt Relations	1
Agriculture	1
Biochemistry/Extension	1
Business	1
Construction Management	1
Criminal Psychiatry	1
Cultural Anthropology	1
Dairy Farm Manager	1
Dentistry	1
Dietician	1
Ecological Restoration	1
Elementary Teacher	1
English Teacher	1
Environmental Science	1
Environmental Studies	1
Federal Law Enforcement or Foreign Service	1
Food and nutrition	1
Food Science R&D	1
Foreign Service	1
Forester	1
Forestry	1
Genetic Engineering	1
Government	1
IT Analyst	1
Landscape Design	1
Landscaping/Greenhouse/Floral Business	1
Lawyer	1
Marine aviator	1
Medical Doctor	1
Medical Research	1
Military/Real Estate	1

Ministry	1
Natural Resources	1
Naval Aviator	1
Nursing	1
Pharmacist	1
Physical Therapy	1
Physician's Assistant	1
Plant Research	1
Real Estate	1
Social Justice	1
Winemaking	1

Appendix N

Vitae

John G. Cannon

Home Address	Email Address	Employment Address
1203 A North Main St. Blacksburg, VA 24060 (540) 320-1438	jocanno1@vt.edu	288 Litton Reaves Hall Virginia Tech Blacksburg, VA 24061 (540) 231-5717

Education

Institution	Dates of Attendance	Degree
Virginia Polytechnic Institute and State University	Fall 2002-Present	Ph. D. Candidate Career and Technical Education
University of Illinois at Urbana-Champaign	1992-1994	M.S. Vocational and Technical Education, Emphasis in Agricultural Education
University of Illinois at Urbana-Champaign	1986-1990	B.S., Agricultural Science

Teaching Experience

Institution	Dates	Responsibilities

Virginia Polytechnic Institute and State University	2002-Present	• Student Teacher Supervisor
		• Courses
		  o Communication Skills
		  o Communicating in Agriculture
		  o Agricultural Issues

Nauvoo-Colusa High School	2001-2002	• Agricultural Instructor • FFA Advisor • Head Baseball Coach
Armstrong Township High School	1996-1998	• Agricultural Instructor • Assistant FFA Advisor
Minooka Community High School	1994-1996	• Agricultural Instructor • FFA Advisor • Assistant Freshmen Baseball Coach