

ABSTRACT

WHITAKER, BRAXTON TANT. Assessment of Barriers to Recruitment and Different Recruitment Strategies of North Carolina High School Students into Undergraduate Agricultural Programs. (Under the direction of Dr. Kimberly Livingston).

There are multiple different barriers when recruiting high school students to undergraduate agricultural programs. Students may have a skewed perception of the poultry industry, or they may not be aware of the opportunities a degree in agriculture can afford them. They may also lack the necessary high school GPA to be admitted to a Land Grant University. The Prestage Department of Poultry Science at North Carolina State University in Raleigh, NC implemented two different programs to aid in recruitment to the College of Agriculture and more specifically, the Prestage Department of Poultry Science. The Poultry Science Summer Institute (PSSI) was started in 2008 with the objective of increasing student awareness of and interest in poultry science as a major. This five-day overnight camp provides physical learning experiences in the field and in the laboratory to help educate students that a degree in poultry science has more to offer than simply being a chicken farmer. Amongst high school students who attend the Poultry Science Summer Institute, 25% of them return to enroll in the department. As the PSSI promotes awareness and interest in poultry science as a major and a career, the goal of the A.S.P.I.R.E. (ACT Supplemental Preparation in Rural Education) program is to decrease the deficits in ACT scores between rural high school students in North Carolina and their urban counterparts by providing a low-cost alternative to ACT preparation courses. Many rural high school students are on track for college admission until review of their SAT/ACT scores. Although these rural students come from agriculturally intensive counties, they are also socioeconomically distressed counties. Fifteen of the top sixteen agriculture-producing counties in North Carolina are considered

rural. Students from these counties often already have the interest in agriculture that the PSSSI promotes, but lack the scores to gain admission to a Land Grant University like North Carolina State University. The course is offered over a 10-week period and includes 30 hours of ACT preparation and four practice examinations. Upon evaluation of the pre-test and post-test, scores significantly increased by 1.81 points on the ACT's 36-point scale.

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Assessment of Barriers to Recruitment and Different Recruitment Strategies of North Carolina
High School Students into Undergraduate Agricultural Programs.

by
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BIOGRAPHY

Braxton was born to Dr. Robert and Susan Whitaker in Charleston, SC at the Medical University of South Carolina on September 25, 1991. He has an older brother, Benton, and two younger brothers, Mason and Alex. After moving from Charleston, SC at age four, Braxton grew up in Salisbury, NC. He loved the outdoors and animals from a young age, and spent as much time as possible after school at the local park across from his house. By the time he was in the 8th grade, he had asked his parents for an incubator for Christmas and had successfully incubated and hatched five Mallard ducklings. He continued to hatch various species of fowl every spring until he graduated from high school. He attributes his passion for poultry science to the ducks across the street from his house.

While in high school Braxton was an honors student and held multiple leadership positions, including being president of his class and captain of the men's swim team. He graduated top ten in his class and chose to attend North Carolina State University in the fall of 2010. After initially attending as a First Year College student, Braxton transferred to Zoology, and almost immediately, transferred again to the Prestage Department of Poultry Science. He completed his B.S. degree in Poultry Science in the spring of 2014. He additionally received a minor in Agricultural Business Management. While an undergraduate student, Braxton was a member of the Poultry Science Club and Alpha Sigma Phi Fraternity.

In July 2014, Braxton was accepted as a Master of Science candidate in Poultry Science at the Prestage Department of Poultry Science at North Carolina State University in Raleigh, North Carolina. Under the direction of Dr. Kimberly Livingston and Dr. Kenneth Anderson,

he attended and presented at the International Production and Processing Expo in Atlanta, GA in January 2016 and also at the Poultry Science Association Annual Meeting Conference in New Orleans, Louisiana in July 2016. After graduation, Braxton plans to pursue a career in poultry live production or poultry company sales.

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CHAPTER I
LITERATURE REVIEW

1.1 Recruitment Techniques

In a report by the USDA on employment opportunities for college graduates with degrees in food, agriculture, natural resources or the environment, Goecker et al. (2015) predicted that there will be nearly 58,000 annual average openings in these fields between 2015 and 2020. In addition, the United States is producing on average only enough students in these areas to fill 61% of the projected annual job openings (Goecker et al., 2015). Gilmore et al. (2006) noted that there has been a decline in the number of baccalaureate degrees and an increase in the diversity of agricultural programs since 2000. This suggests that student recruitment is of the highest priority to supply graduates to meet agricultural industry needs (Esters, 2007).

Upon evaluation of factors that influence a students' collegiate choice, Chapman (1981) found that socioeconomic status, educational aspirations, aptitude and prior educational performance were all relevant. Students from low-income families identified their parents as the greatest influence on their career decision (Peterson et al., 1986). Esters (2007) stated that students from urban agricultural programs also identified their parents as their primary influence on enrollment in agricultural education. Torres and Wildman (2001) found that prior agricultural experience and relatives in agriculture have the greatest influences on students' selection of an agricultural major.

Increased urbanization and the influx of college applicants lacking any prior agricultural experience have caused new problems (Dyer et al., 2003). Successful recruitment and subsequent retention of high school students to colleges of agriculture has been a historically important issue (Tarpley and Miller, 2004). Students from rural areas are significantly more likely to pursue a degree in agriculture, however, recruitment of urban students should not be

ignored (Tarpley and Miller, 2004). Colleges of agriculture that have historically enrolled students from rural areas have suffered a negative impact from increased urbanization (Esters, 2007). Frazee et al. (2011) found that students without a background in agriculture view agricultural fields negatively and lack awareness of career opportunities in agriculture. Espey and Boys (2015) conducted Carolina. They found that undergraduate student recruitment was allocated few resources and little financial support amongst the academic departments surveyed, noting that a small pool of staff members participated in recruitment at all (Espey and Boys, 2015). The students were surveyed to collect data on student demographics, study habits and academic performance (Espey and Boys, 2015). They found that the student's parent's occupation was significant in influencing their college major choice. Also, the information provided by their parents on university programs which was weighted heavily by the students (Espey and Boys, 2015). Myers et al. (2004) utilized focus groups to determine problems with recruitment and found issues that ranged from teacher quality to the stereotypical "farm image" perceived by the students about agricultural education. Effective communication to students and their families about the opportunities in agricultural programs should increase enrollment (Myers et al., 2004).

The majority of recruitment programs in place by post-secondary institutions focus their recruitment on high-achieving students (Grimes and David, 1998). Warburton et al. (2001) concurs with his findings that as the level of difficulty of the students' coursework increased, so did their GPA and their likelihood to succeed in college. However, many rural schools suffer from a phenomena Artz (2003) calls "brain drain," or the migration of more highly educated people away from rural areas. This migration causes a withdrawal of resources, making it even more difficult for these rural students to prepare for college (Howley et al.,

2009). White et al. (1991) notes that the general assumption of agriculture by urban youth was that it was for those with an agricultural background, worked outside and participated in on-the-job training. Conroy (2000) found that students equate agriculture with science, but not with computers or engineering. In addition, traditional extracurricular activities in agriculture, such as 4H and FFA, have not aided in recruitment of urban students because they are rarely offered in urban high schools (Fraze et al., 2011). Students' perceived likelihood of success in a career field greatly affects their decisions about future careers (Fraze et al., 2011). Considering the growing deficit in college graduates with a degree in agriculture by the job market, a key recruitment technique is to educate them on the opportunities a degree in agriculture can provide.

1.2 Summer Camps

Engaging youth in agriculture outside of the classroom has been a movement since the inception of 4-H clubs in the early twentieth century. By 1914, the Cooperative Extension Service of the USDA was sponsoring the program (Riney-Kehrberg, 2011). Even though 4-H clubs promoted the use of modern agricultural techniques on projects, the program lacked a sense of adventure for rural students (Riney-Kehrberg, 2011). Consequently, Dexter D. Mayne created a program called The Farm Boy Cavaliers of America, modeled after the Boy Scouts of America, in 1916 (Riney-Kehrberg, 2011). This small social experiment only lasted until 1920, but it added an air of romance to agriculture and chapters were organized in nearly 30 states (Riney-Kehrberg, 2011).

Students are often unaware of agriculture and the opportunities an agriculture degree can afford, therefore it is critical to provide them with ways to increase their awareness of agriculture (Marsh et al., 2011). Gilmore (2006) cites a study by J. A. Gonzalez, 2006,

stating that 41% of high school students have a misconception or image issue with agricultural sciences, 33% lack knowledge on potential career opportunities agricultural sciences can offer and 22% lack knowledge on the fields of study in agricultural sciences. Overbay and Broyles (2008) note that the overwhelming student perception of agriculture is that it equates to farming, which is viewed as tedious physical labor with low pay. It is for this reason that some students avoid agricultural sciences when choosing a major (Marsh et al., 2011). Cotton et al., (2009) notes that summer programs have been found to increase student interest in and knowledge of agricultural programs and what they have to offer.

Dave et al. (2010) states that institutions of higher learning across the United States are investigating ways to increase the number of eligible students graduating from high school. He also notes that it is clear that something needs to be done to encourage students to enter the fields of science, technology, engineering, and math (STEM) (Dave et al., 2010). It is of the utmost importance that strategies to increase student involvement in the sciences be developed and their success be fostered (Bachman et al., 2008).

Programs across the nation have been created to increase college knowledge and readiness (Swail and Perna, 2002). Loza (2003) names them early outreach programs and Cotton et al., (2009) states that these programs can be used to inform students that a degree in agriculture has more to offer than a career in farming. Annually, millions of students attend residential summer camps (Ventura and Garst, 2013). Yilmaz et al. (2010) found that summer camps are an effective tool for recruiting students to STEM majors.

Foster and Savala (2012) used two residential summer camps, a week long program and a six-week long program, at Michigan State University to examine how the experience affected the students' attitudes towards post-secondary education and degrees in Food,

Agriculture and Natural Resources (FANR). They found that both programs had a positive effect on students' attitudes toward post-secondary education and degrees in FANR (Foster and Savala, 2012). All the students who participated in either program gained increased knowledge of what college life is actually like, in addition to the possibilities a degree in FANR has to offer (Foster and Savala, 2012). Students who participated in the longer program increased their understanding of what acceptance to college requires (Foster and Savala, 2012).

Vocational agricultural programs such as FFA and 4-H have proven effective in increasing student knowledge of agriculture where they are offered. Summer camps have also proven to increase student awareness of and interest in agriculture (Cotton et al., 2009 and Galbraith et al., 2003). According to Kong et al., (2013), science summer programs have proven to be an effective recruitment tool to the STEM fields. Kong et al., (2013) goes on to further cite a study by N. Bachman et al., 2008, stating that science summer camps have an aspect of student recreation and social activities. Consequently, it is crucial that researchers and educators utilize this notion on science summer camps to effectively recruit and retain students (Bachman et al., 2008).

Over-night summer camps have proven to be an effective tool in stimulating students outside of traditional schooling. Therefore, they are becoming more widely used to give high school students a glimpse of college life, and to link the enjoyment of a summer camp with opportunities to learn about agriculture.

1.3 Experiential Learning

Stanton and Grant (1999) note that educational programs are often categorized as either involving thinking or doing. They further state that this division is less true for educational

programs that are work-based, or vocational in nature. Bourman and Boulay (2004) note that academic losses frequently occur over summer break because students often do not utilize this time period. Approaches to education have shifted away from traditional lectures and rote memorization over the past decade (Stanton and Grant, 1999). Huba and Freed (2000) state that there has been a recent shift from teacher-centered learning to student-centered learning. In particular, Stanton and Grant (1999) note that these shifts are especially common when the education involves training directly related to the work area. Due to these shifts, experiential learning allows students to bridge classroom knowledge with realistic experiences (Tendo et al., 2014). Experiential learning can be defined as “the process by which a learner creates meaning from direct experience” (Bohn and Schmidt, 2008, p. 5). Kolb and Kolb (2005) note that experiential learning is a process where the learner: experiences, reflects, thinks, and then acts in a recursive manner in response to what is being learned. Scholars agree that experiential learning is critical in providing students with technical experience in addition to problem-solving and critical thinking skills (McCleery et al., 2005; Ryan and Campa, 2000). Experiential learning involves thinking and doing, both of which must be related in the mind of the learner (Stanton and Grant, 1999). As learners, we develop our preferred method of learning based off our environment and life experiences (Kolb and Kolb, 2005).

Millenbah and Millspaugh (2003) note that when students were afforded the opportunity to interact with the materials being taught, they retained information longer and showed a greater enthusiasm for the subject. In addition, experiential learning allows for students with different learning styles to maximize their opportunities (Millenbah et al., 2000).

Today's high school students often do not understand the multidisciplinary nature of agriculture (Marsh et al., 2011). The students fail to note that agriculture is more than production and marketing, but it is also the science of the disciplines (Marsh et al., 2011). Experiential learning is not a new idea to the field of agriculture (Wulff-Risner and Stewart, 1997). As early as 1938, John Dewey was researching the connection between actual experiences and education (Dewey, 1938). Marsh et al., (2011) implemented an experiential learning summer camp in Maryland for students interested in horticulture. They found that the students who participated in the internship increased their knowledge about horticulture however, many still viewed the area of agriculture as farming, mirroring the findings of Overbay and Broyles (2008) (Marsh et al., 2011).

Tendo et al., (2014) evaluated the effects of a National Animal Health and Food Security Policy (NAHFSP) course on addressing issues of global significance. The NAHFSP course utilized problem based learning (PBL) techniques to allow the students to address the problem of climate change through experiential learning (Tendo et al., 2014). The course involved four learning strategies, including experiential learning, and aimed to give students a clear understanding of the governing and policies that effect climate change, food security, trade and animal health (Tendo et al., 2014). The PBL approach to learning allows a few instructors to effectively facilitate up to 30 students at a time (Hyams and Raidal, 2013). They found that this model has proven effective, provided that certain criteria are met (Tendo et al., 2014). Considering high school student's need for hands-on experiences and immediate gratification, experiential learning has proven effective in capturing student's attention for a longer time, and promotes greater knowledge retention.

1.4 ACT Preparation

College entrance examinations have seen exponential growth since their conception in 1901 (Atkinson and Geiser, 2009). Briggs (2001) states that college entrance examinations do not account for the students' high school performance, but are instead intended to be an independent and objective measurement of college "readiness." Standardized testing is often seen as a better indicator of success at the post-secondary level than high school grade point average because grade standards vary by school (Atkinson and Geiser, 2009). However, college admissions committees consider a multitude of factors when evaluating an applicant for acceptance to an institution of higher education (Lane et al., 2009; Mattern et al., 2011), these factors include: high school transcripts, letters of recommendation, college entrance examination scores, extracurricular activities, and essays (Rigol, 2004). These criteria are required so that admissions professionals have as much information as possible to determine whether or not a student will succeed at an institution (Mattern et al., 2011).

Although the use of college entrance examinations has proven to be successful, there is some discussion that entrance examination scores are not the best indicator of success at the post-secondary level (Atkinson and Geiser, 2009). Rothstein (2004) estimates that because of the exclusion of socio-economic status, the predictive power of the SAT is overstated. However, Atkinson and Geiser (2009) found that high school grade point average retains predictive power because it is less closely associated with socio-economic status. In addition to the fact that the ACT is more closely tied to high school curriculum than the SAT, the ACT also focuses more on content mastery than on test-taking skills (Atkinson and Geiser, 2009). The goal of college entrance examinations is to standardize the students for

comparison to one another (Mattern et al., 2011), (Atkinson and Geiser, 2009), rather than to evaluate mastery of the curriculum (Atkinson and Geiser, 2009).

A major concern regarding standardized admission testing is the effect of college entrance examination instruction on test performance and ultimately, college acceptance (Mattern et al., 2011). Many companies who offer professional test preparation services charge hundreds of dollars for the courses (Mattern et al., 2011). Mattern et al. (2011) goes on to state that since the cost of these courses are so high, those students from higher socio-economic status families are unfairly benefitting from additional instruction. Briggs (2001) notes that college entrance examinations, such as the SAT and the ACT, are designed to be unaffected by high school curriculum and short-term test preparation. Rooney (1998) argues that strict test score requirements on college entrance examinations serve as a barrier to admissions for those students who performed well in high school, but whose test scores do not reflect that knowledge.

In 2001, Derek Briggs published a paper on the effects of admissions test preparation. He evaluated the effect of coaching on the SAT and the ACT under three different models with an increasing number of controlled variables to evaluate the effect of coaching on ACT scores. Model 1 measured no control variables on than previous test scores, model 2 included demographic variables and indicators of high school performance. Finally, model 3 was the full model with all theoretically relevant control variables, including: proxies for student motivation and and dummy variables for other test preparation activities. Models 1 and 2 had N=305 coached students out of 2390 total students, model 3 had N=208 coached students out of 1544 total students. In regard to the ACT, he found that the math section scores decrease drastically from model to model. By the final model, model three, the effect

of instruction was no longer statistically significant. The English section scores were not statistically significant under models one or two, however, when all controlled variables are added in model three, the estimated effect of instruction becomes statistically significant. Finally, under the reading section, the estimated effect of instruction increases under model two, but returns to the baseline when all controlled variables are applied in model three. Briggs (2001) ultimately concludes that regardless of the controlled variables applied under any of the models, when rounded to ones in absolute value, the estimated effect of instruction is never more than one point for each ACT section. College test preparation courses have become more beneficial than ever as more and more students take both the ACT and the SAT. However, the gap in access to these test preparation courses between urban and rural students is getting wider and serves as a barrier for admission for many rural high school students.

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CHAPTER II

Evaluating the Poultry Science Summer Institute (PSSI) as a Recruitment Tool for High School Students from North Carolina Counties to Enter the Prestige Department of Poultry Science

Abstract

The constant rise in consumption of poultry products within the United States has resulted in increased career opportunities within the poultry industry. However, currently there are not enough graduates to fill the available positions. The cause may be associated with the increased competitiveness for university admission and ignorance of the many opportunities in poultry science have all contributed to the employee gap in the poultry industry. To address this need and increase the awareness, the Prestage Department of Poultry Science started the Poultry Science Summer Institute (PSSI), a five-day overnight camp for high school students. During their stay, the students were given the opportunity to learn about genetics, reproductive physiology, avian anatomy, poultry processing, and feed milling. The objective of this study was to evaluate the rate of return of students who participated in the PSSI summer camp and then entered the NCSU four-year poultry science program or the two-year AGI program from 2008 through 2014. During this time, the proportion of PSSI alumni who pursued a degree in poultry science ranged from 10% to 31%. The overall average proportion of participants entering the poultry science four-year program was 19.35%, while an additional 7.74% entered the two-year program. Overall, the PSSI camp has increased the exposure of high school students to the poultry science department and potential career opportunities within the poultry science field.

Introduction

Recruitment of high school students to poultry science and other agricultural programs has become a vital component in continuing to provide the poultry industry with graduates with degrees in agriculture. The last 70 years has experienced the evolution of the chicken from a luxury product to a regular source of protein for most developed nations

(Dixon, 2002). The need for professionals in the food and agricultural sciences is projected to increase by 10% by 2020 (Hegerfeld-Baker et al., 2015). Today, 81% of agriculture careers require either a two or four-year degree and 64% of applicants to AgCareers.com in 2015 had an education level of bachelor's degree or higher (AgCareers.com). In addition, more than half (54%) of applicants had agriculture-based post-secondary education (AgCareers.com). Pardue (1990) conducted a survey of poultry science undergraduates at a major land grant university and found that over half of those students surveyed had some previous poultry experience. It concludes that one way to increase enrollment is to introduce and involve students to poultry science before application and admission to college. Programs have been created across the country to increase college knowledge and readiness to address this problem (Swail and Perna, 2002). These programs aim to diminish the college knowledge and access divide that currently exists (Martinez et al., 2015). They are collectively known as early outreach programs (Loza, 2003). By using these programs to broaden youths' perspective of agriculture beyond just farming, these early outreach programs encourage students to pursue careers in agriculture (Cotton et al., 2009).

Many industry partners and associations support university outreach and recruitment programs. They are motivated to help universities increase enrollment, train and develop students to fill positions within in the industry. US Poultry and Egg Association, formed in 1947, is the world's largest and most active poultry organization and created a program to provide funds to poultry science and other agriculture departments for student recruitment (USpoultry.org). The Prestage Department of Poultry Science at North Carolina State University in Raleigh, NC is a recipient of a portion of these donations and have used these funds to establish the Poultry Science Summer Institute.

Recruitment to the poultry industry can be difficult because of the general public's perception of the poultry industry. Rudd and Smick-Attisano (1995) found that perception of the discipline of agricultural sciences and attitudes toward it may be negatively impacted if exposure to the discipline is absent or deficient. Chamblee (2007) stated that "Young people simply do not understand the science and technology involved in producing poultry meat and eggs, nor do they have any concept of the science involved in genetics and breeding, nutrition, incubation and hatching, environmental issues or processing". Additionally, misconceptions and false impressions can stymie efforts to attract students to seek a degree in poultry science (Chamblee, 2007). It is these misapprehensions that contribute to the general understanding of poultry production as either backyard flocks or "factory farming" (Chamblee, 2007). Students need opportunities to explore the poultry industry, its true structure, its economic impact and its rich scientific foundation. Only those students who are aware of career opportunities in poultry will be able to take advantage of them.

The Science Agricultural Summer Experience program was developed to allow students the opportunity for experiential learning, coupled with critical thinking, to promote the retention of knowledge gained (Martinez et al., 2012). Similarly, the Poultry Science Summer Institute (PSSI) program strives to provide hands-on learning and real world applications to introduce students to opportunities in poultry science that will have a long-lasting impact on their future educational and career plans. However, Martinez et al (2012) found that although recruitment tactics motivated many students to apply to the program, there were large discrepancies between those who said they would apply and those who actually enrolled. The objective of PSSI is to increase student awareness of and interest in poultry science as a major, as well as to encourage students to apply to and enroll in the

Prestage Department of Poultry Science. This was accomplished by providing a curriculum focused on physical learning experiences in the field and in the laboratory, as well as educating the students that there is more that can be accomplished with a poultry science degree than simply raising chickens.

The curriculum has consisted of: anatomy, egg formation and reproduction, blood collection, artificial insemination, hatchery, incubation and brooding, embryology, DNA fingerprinting, calculating egg grade and poultry judging, and further processing. These topics were selected to represent the variety of content and skills utilized in an undergraduate degree in poultry science and as possibilities for post-graduate work. Additionally, the curriculum capitalizes on the expertise of those instructors contributing to the program. The PSSI instructional activities included a dissection and identification of the gross anatomy and the reproductive tract of a chicken, the proper technique for blood collection without harming the bird, artificially inseminating a live hen with the sperm from a rooster, performing egg break outs to judge the stage of embryonic development, DNA fingerprinting, and further processing a bird from whole carcass to cut up. The students were given a post-camp survey during the final reception where they were asked to rate their experiences during PSSI on a five-point Lykert scale.

Literature Review

The need for post-secondary education has increased in importance as the global economy becomes more knowledge-based (Odo et al., 2012). Most people will agree that the changes facing global society will require life-long learning (Abeles, 2012). What is considered a formal education, pre-kindergarten through grade 12, is a base education for all citizens provided by the government. Post-secondary education, however, is rapidly

becoming a requirement while simultaneously becoming less of an option for all (Abeles, 2012). The federal government spent \$147 billion on financial aid in the 2010-2011 school year alone (Dynarski and Scott-Clayton, 2013). Additionally, despite dramatic increases in post-secondary education enrollment, gaps still exist between those who go to college and those who ultimately succeed (Swail and Perna, 2002). These gaps could be due to the fact that typical methods of promoting students to continue their education to the collegiate level have centered around enrollment issues, ignoring the necessary steps to be mentally, physically and emotionally prepared for college (Swail and Perna, 2002). Therefore, programs have been created across the country to increase college knowledge, readiness, enrollment, and completion (Swail and Perna, 2002). These programs are known collectively as early college outreach programs (Loza, 2003).

It is evident that something needs to be done to encourage young adults to enter the fields of science, technology, engineering and mathematics (STEM) (Dave et al., 2010). There is also an unclear understanding of the barrier between those students who do choose agriculture as a field of study and those who continue on to teach agriculture at a post-secondary level (Calvin and Pense, 2013), adding to the deficit of those willing and able to recruit students to agriculture. It is imperative at this point that strategies be developed to increase student involvement in the sciences and in turn foster their success (Bachman et al., 2008). Institutions of higher learning around the United States are looking into ways to expand the number of eligible students graduating from high school (Dave et al., 2010). Dyer and Breja (2003) found that the teachings of agricultural education and production had historically been aimed at rural, white males from an agricultural background. Due to the projected increase for the need of agricultural professionals this prior pool of recruits is not

enough. Agricultural programs also need to recruit urban and minority youth (Alston and Westbrook, 2006). Millions of students attend residential summer camps each year (Ventura and Garst, 2013), which can be used as early intervention programs to improve academic preparation and college readiness (Swail and Perna, 2002). Yilmaz et al. (2010) found that summer camps are an effective tool for recruiting students to STEM majors. Agricultural recruitment can be difficult because of the general public's view of agriculture as the "study of 'cows, sows, and plows'" (Beyl et al., 2016, p. 51). However, modern agriculture encompasses a wide array of specializations and it is important at this point that the current myth about agriculture be eliminated and replaced with a durable understanding of the science in technology that is modern agriculture (Beyl et al., 2016).

Materials and Methods

The PSSI has been offered to high school students every summer since 2008 with North Carolina State University (NCSU) serving as the primary location. PSSI provides an educational and enjoyable five-day, five-night program, consisting of field and laboratory experiences, data collection and analysis, and field trips to introduce students to an array of career paths that can be pursued with a degree in poultry science. The program emphasizes major topics in poultry science and production, including anatomy and physiology, incubation and breeding, embryology, DNA extraction, and further processing.

The application process seeks to find students from rural communities who will benefit most from the PSSI. The majority of the students who attend are from Tier 1 counties in North Carolina. However, the application pool is open to high school students across the country. The PSSI enrolls approximately 20 students per summer. Applicants must be rising sophomores, must have a GPA of at least a 3.0, and complete a short application and essay.

The application requested information regarding any experience or interest in poultry, e.g. 4H, FFA, turkey show, as well as extracurricular activities and their ACT/SAT scores if available.

The post-camp survey is formatted on a five-point Lykert scale, where one is poor and five is excellent. The students were asked to rate each activity from one to five, and were provided with space to make additional comments. At the end of the survey, the students were asked which activity they enjoyed the most, which they enjoyed the least and to provide their input on changes for the next year.

Survey data and student demographics were analyzed via SAS 9.2 (Cary, NC). The Frequency procedure, which computes various statistics to examine the relationship between two classification variables, was used to evaluate the proportion of students to return to the department according to their high school class upon attendance to the PSSI.

Results

Analysis of student demographics includes those attending the PSSI for years 2012, 2013, 2014, and 2015. The majority of students attending the program were from Tier 1 (Appendix B) counties in North Carolina. In 2012, 75% of the PSSI attendees were from rural counties in North Carolina. In 2013, approximately 63% of attendees were from rural counties, while in 2014 and 2015, 70% and 81% were from rural North Carolina counties, respectively (Figure 1A).

In 2013 twice as many PSSI attendees who enrolled in the Prestage Department of Poultry Science, were from urban counties (66%) compared to those from rural counties. However, in 2012 and 2014, the exact opposite is true. The majority of those students who enrolled in the department after attending PSSI (66%) were from rural counties rather than

urban ones. In 2015, 100% of enrollees in the Prestage Department of Poultry Science were from rural counties (Figure 1B).

The SAS Frequency Procedure was used to analyze the enrollment in the Prestage Department of Poultry Science by high school class after attending the PSSI for years 2012-2015. Proportions of enrollment after attendance for rising seniors ranged from 30%-75% (Table 1). In 2012, 41.67% of rising seniors who attended the PSSI returned to enroll in the department. In 2013, approximately 30% of rising seniors returned to the department, 75% returned after attending in 2014 and only one senior (16.67%), although three were accepted, enrolled in the department after attending the program in 2015. Of those rising juniors who attended in the same years, 16.67% returned after attendance in 2012 and approximately 28% returned after attendance in 2013 (Table 1). No rising juniors who attended in 2014 enrolled in the department. The rate of return for rising juniors who attended in 2015 cannot be analyzed because they have yet to go through the college admissions process.

Upon analysis of the proportion of students who enrolled in the department after attending the PSSI from years 2012-2015, nearly 40% of rising seniors enrolled in the department, ($P<0.01$). Only 20% of rising juniors enrolled, and no rising sophomores who attended the PSSI in 2012 went on to enroll in the Prestage Department of Poultry Science (Table 2). Statistics of sophomore attendees from 2013, 2014, and 2015 who may enroll cannot be analyzed because they have not yet graduated high school.

The basic curriculum of the program consisted of the major areas of study within poultry science, aiming to increase interest in the field of study and the poultry industry beyond. Table 3 displays the results of the students' ratings of the major educational experiences provided during the weeklong summer camp. The results show that the students

found the anatomy, egg formation and reproduction, poultry processing, and hatchery, incubation and breeding labs the most enjoyable, with 90% or above rating the experiences as above average or excellent. Unsurprisingly, the two lowest ranking experiences were those involving the least hands-on opportunities, DNA fingerprinting and egg school, judging and welfare, with, only 63% and 78% of students rating them as above average/excellent, respectively.

Discussion

The comprehensive goal of the PSSI program was to increase interest in poultry science as a major as well as a possible career path. To accomplish this, a broad curriculum representing various aspects of poultry science was developed and implemented for the summer camp.

Students were notified of the camp via their high school guidance counselors, their local 4H agent or FFA representative, or Vocational Agriculture instructor. Students interested in attendance submitted their application online. Approximately 20 students each year are accepted into the program. These students are selected for attendance based on their responses on their applications. Applications requested information on any interest in or prior experience with poultry, as well as their current GPA, extracurricular activities, and their SAT/ACT scores if available. It is not uncommon for students in rural counties to experience discouragement from extracurricular academic activities. Regarding the Summer Agricultural Science Experience, Martinez et al. (2012) indicated that there are a multitude of reasons that discourage rural high school students from enrolling in summer outreach programs, including little or no access to college preparation material, a lower socio-

economic status, or an obligation to stay and help their family. Similarly, the predominately rural PSSI attendees may experience these same barriers.

Qualitative trends from student surveys indicated that students expressed preferences for several activities presented during the program. The educational trip to the College of Veterinary Medicine was amongst the most popular field trips. Additionally, students appeared to prefer the more hands-on learning experiences, such as further processing, to those experiences that were more visual, such as observing egg grading and poultry judging. This preference can be attributed to the fact that high school students prefer the satisfaction and benefits of hands-on learning (Sadeh and Zion, 2012). Student responses to possible changes for the future reinforced the preference for experiential learning. Students responded that they wanted fewer lectures and tours, and more hands-on laboratory experience. Most students indicated that they would enjoy participating in the program again. Ultimately, this shows that the PSSI was successful in offering high school students a glimpse of the reality of college life without dissuading them from pursuing a college education.

In conclusion, the research suggests that a program focused on active learning and hands-on experiences can increase interest in and aid in recruitment to the field of poultry science. The PSSI provides students with a unique opportunity to scratch the surface of what the field of poultry science has to offer. Over the week, the students were exposed to a wide array of learning experiences in poultry science, and one can speculate that engaging the students in a focused curriculum may lead to more knowledge gained and retained. A wider study would need to be performed to determine if programs like the PSSI effectively recruit a variety of students or just those who already have a preexisting interest in poultry.

Nonetheless, the consistent enrollment of students in the Prestage Department of Poultry Science after attending the PSSI, in particular those students who attended as rising seniors in high school, provides evidence that this recruitment style is effective. Additional educational experiences are being explored as a result of the student surveys, as well as the possibility of hosting two camps per summer, one for rising seniors and one for rising juniors, to increase the number of students exposed.

Summary

The increased need for graduates with a post-secondary degree in the work field parallels the need for more poultry science students and graduates. North Carolina State University, with funding from US Poultry and Egg Association, started the Poultry Science Summer Institute (PSSI) program to address this need. The comprehensive aim of the PSSI is to increase awareness of the poultry science field and the career paths it has to offer, in addition to introducing the students to the sciences that take poultry science beyond mere chicken farming. The PSSI has proven to be successful, especially amongst rising seniors who attended, with nearly 40% of those seniors returning to the Prestage Department of Poultry Science.

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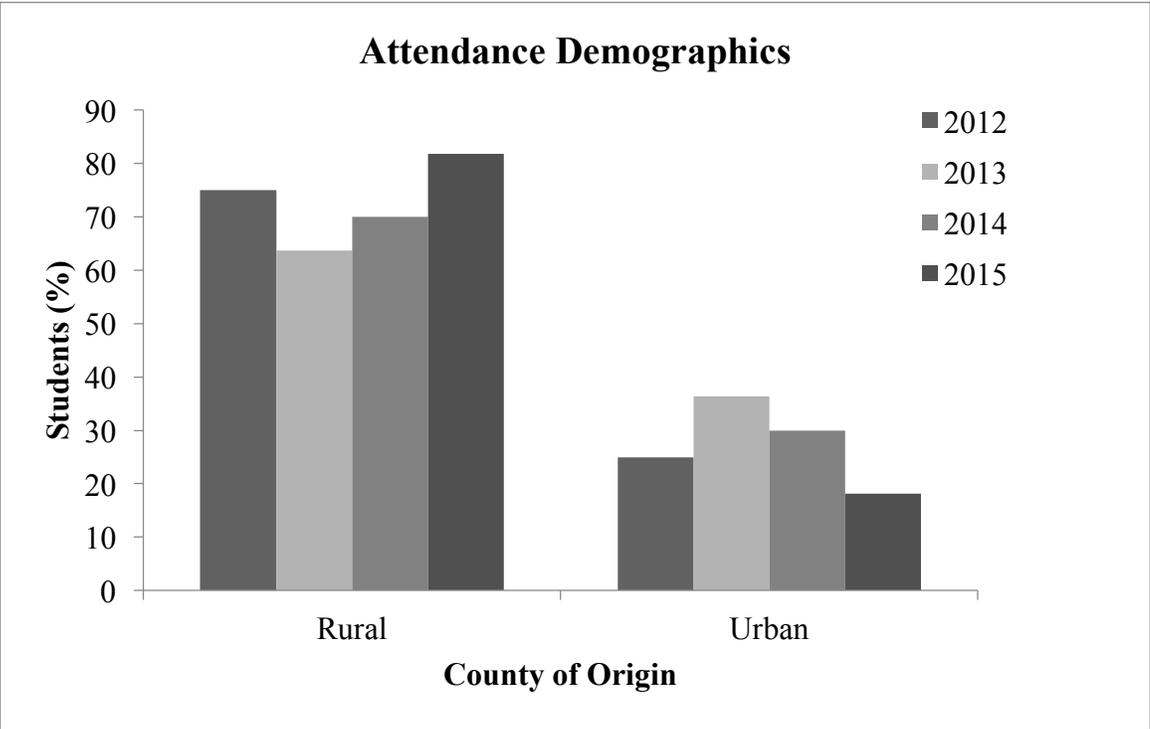


Fig. 1A Student demographics of those who attended the PSSSI program

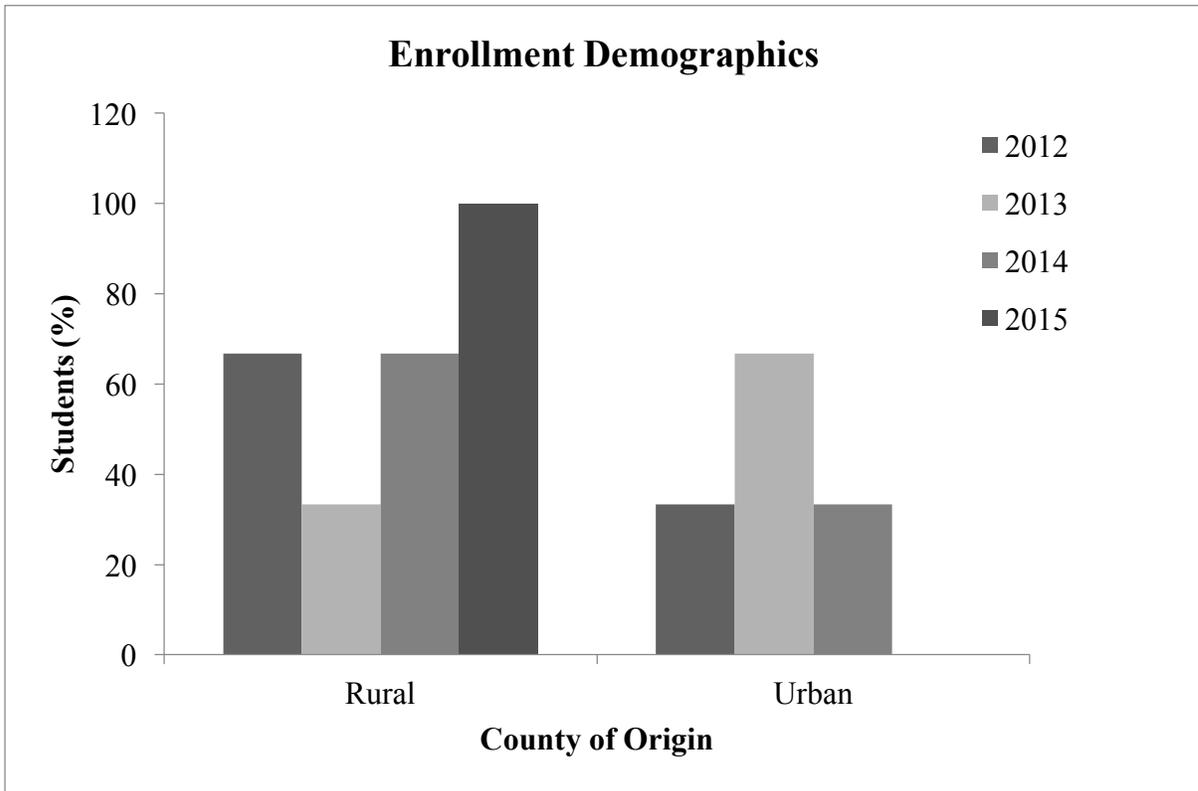


Fig. 1B Student demographics of those students who enrolled in the Prestage Department of Poultry Science after attending the PSSI

Table 1 Proportion of attendees to enroll in the department

	2012	2013	2014	2015
Rising Seniors	41.67% (5/12)	30.76% (4/13)	75% (6/8)	16.67% (1/6)
Rising Juniors	16.67% (1/6)	28.57% (2/7)	0%* (0/5)	0%* (0/9)
* Denotes incomplete data because students have not yet applied to college				

Table 2 Total percent of enrollment in the department after program attendance

Frequency (%)	Rising Soph	Rising Junior	Rising Senior	Total
Yes	0.00	21.43	37.50	26.87
No	100.00	78.57	62.50	72.13

Table 3 Students' ratings of educational experiences

	Frequency	Percent
Anatomy, Egg Formation and Reproduction Lecture		
Excellent/Above average	60	90
Average	4	6.67
Below average/poor	2	3.33
Total	66	100
Egg Grading, Judging & Welfare		
Excellent/Above average	52	78.79
Average	11	16.67
Below average/poor	3	4.54
Total	66	100
Poultry Processing Lab		
Excellent/Above average	61	92.42
Average	4	6.07
Below average/poor	1	1.51
Total	66	100
Hatchery, Incubation and Brooding Lab		
Excellent/Above average	60	90.91
Average	6	9.09
Below average/poor	0	0
Total	66	100
Embryology and Incubation Lab		
Excellent/Above average	59	89.40
Average	6	9.09
Below average/poor	1	1.51
Total	66	100
DNA Fingerprinting		
Excellent/Above average	42	63.63
Average	12	18.18
Below average/poor	10	15.15
Total	64	96.96*

* Denotes percentages that do not add up to 100 because of missing data

CHAPTER III

Assessment of the A.S.P.I.R.E. (ACT Supplemental Preparation in Rural Education) program as an effective extension tool to decrease deficits in ACT College entrance examination scores in rural high school students

Abstract

The college admissions process evaluates five major areas when determining whether or not a student is eligible for admission: GPA, personal statement, extracurricular activities, letter(s) of recommendation, and SAT/ACT examination scores. Many rural high school students are on track for admission to a land grant institution until the review of their SAT/ACT scores. Although these rural students come from agriculturally intensive counties, they are also socioeconomically distressed counties. And as such, these students often display lower examination scores than those students from urban counties. Fifteen of the top sixteen agriculture-producing counties in North Carolina are considered rural (Appendix A). The students from rural counties are often unsuccessful in obtaining admissions to universities that offer Bachelor of Science degrees in agriculture and life sciences because of this significantly lower scores on college entrance exams, such as the ACT. The A.S.P.I.R.E. program has been running in cooperation with North Carolina State University (NCSU) for five years. The goal of the A.S.P.I.R.E. program is to bridge the gap between rural high school students' performance on the ACT and the performance on the same examination by their urban counterparts. The program consists of 30 hours of ACT preparation, including four practice examinations over a 10-week period. Data related to completion rate was collected in conjunction with the practice ACT scores. Upon evaluation of participant's first composite score versus fourth composite score using SAS proc correlation, there was a significant increase between the two by 1.81 points ($P < 0.01$). In conclusion, the A.S.P.I.R.E. program is an effective tool that reduces the gap in scores between rural and urban high school students.

Introduction

One of the biggest issues amongst the leaders in agricultural education over recent years has been the decline in enrollment in high school agricultural programs (Hoover and Scanlon, 1991). Myers et al. (2004) found that the greatest barrier to agriculture recruitment, identified by high school students, was the commitment of the teachers. The students cannot enroll in a program if they are not afforded the opportunity. Peterson et al. (1986) found that amongst low-income families, students identified their parents as the greatest influence on their career decisions. Students from urban agricultural programs also identified their parents or guardian as their primary influence for enrollment in postsecondary agricultural education (Esters, 2007). The students also reported that an interest in agriculture and career opportunities influenced their decision (Esters, 2007). Burney and Beilke (2008) found that in order to succeed academically, a student requires the necessary background and opportunities to do so, which are often lacking or absent in low-income, or rural areas. Myers et al. (2004) suggests that effective communication to students and their families about agricultural programs should increase enrollment in agriculture programs. Students, and those who influence their college and career decisions, need to be aware of the opportunities for graduates with agricultural degrees, and the programs that lead to them.

Agricultural education consists of three primary components: classroom instruction, hands-on experiential learning, and extracurricular activities (Dailey et al., 2001). They postulated that a combination of the three is an excellent way to engage students in content and life skills necessary for adulthood. Dyer and Breja (2003) found that agriculture education and production agriculture were historically taught to rural, white males from an agricultural background. However, with increasing concerns about agriculture student numbers, colleges of agriculture are being challenged to find ways to increase diversity and

appeal to new prospective students (Torres and Wildman, 2001). Due to the 10% projected increase by 2020 for food and agricultural sciences professionals (Hegerfeld-Baker et al., 2015), agricultural education needs to be effectively expanded to include urban and minority youth (Alston and Westbrook, 2006). Since 2000, there has been a decline in the number of baccalaureate degrees and an increase in diversity in agricultural programs (Gilmore et al., 2006), suggesting that student recruitment is of the highest priority to supply graduates to meet agricultural industry needs (Esters, 2007).

Recruitment decisions are central, especially in higher education (Roebken, 2010) and recruitment to the scientific community is one oft-stated goal of science education (Shapiro, 2012). Occupational advances in technology require a workforce with college-level competencies in all academic and vocational areas (Grubb, 1996). However, not all high school students are afforded the same opportunities when preparing for college. Cross and Dixon (1998) state that students from rural areas have less access to college preparation material, a longer commute time for extracurricular activities, and general lack of accessibility to resources, compared to their urban counterparts. Secondary school populations with higher minorities and lower-income students are less likely to offer challenging coursework (Martin et al., 2005). Furthermore, Burney and Beilke (2008) add that rural students have limited proximity to extracurricular programs, and they go on to state that this lack of proximity may hinder the students' competence, confidence and social skills necessary for success in academia. Esters (2007) argues that colleges of agriculture that historically enrolled students from rural populations have suffered a negative impact from increased urbanization. New problems have occurred with the increased urbanization and the influx of college applicants with no prior agricultural experience (Dyer et al., 2003). If an

institution wants to retain students, they need to facilitate students' social integration into the institution (Braxton, 1999). Dyer et al. (2003) notes that financial losses occur when students with high academic achievements are admitted to and then drop out of colleges of agriculture before graduation. Esters concludes in another paper that in order to produce the necessary number of agriculture professionals needed by the industry, students need to be recruited from "nontraditional", or urban, backgrounds (Esters and Bowen, 2004).

The majority of institutions of higher education with recruitment programs in place focused their recruitment on high-achieving students with above-average high school grade point averages (Grimes and David, 1998), which parallels the findings of Warburton et al. (2001), that as the difficulty of the students' high school coursework increased, so did their corresponding GPA and their likelihood to succeed at the postsecondary level. However, Grimes and David (1998) concluded that high school grade point average was not a good method for identifying possible college recruits. Many rural schools, due to the migration of more highly educated people from rural areas, a phenomena Artz (2003) calls "brain drain," in turn suffer from the withdrawal of resources, making offering specialized courses and services, such as college test preparation, even more difficult (Howley et al., 2009). Other than high school GPA, college entrance examination (SAT/ACT) scores are the only valid measurement of predicted post-secondary education success (Fleming, 2002). School board officials from rural areas are anxious for more research-based studies on early intervention strategies to aid student success in rural communities (Arnold et al., 2005). One solution to the recruitment challenge has been the expansion of education programs to engage and inform prospective students (Myers et al, 2012). In order for students to make informed

choices and prepare for a successful career, they need to know the range of possibilities the future agricultural industry has to offer (Conroy, 2000).

About A.S.P.I.R.E.

The A.S.P.I.R.E. program is a program that was implemented by the College of Agriculture and Life Sciences at North Carolina State University in Raleigh, NC in conjunction with the North Carolina Cooperative Extension system and the Princeton Review Test Preparatory Company. This statewide program was designed to decrease the deficits in college entrance examination scores for students interested in obtaining a degree in the College of Agriculture and Life Sciences. The primary objective of the A.S.P.I.R.E program is to assist students from rural, and typically economically distressed, counties who want to obtain post-secondary degree (Herman et al., 2013).

The instructors for the program have been selected from involved teachers as well as the North Carolina Cooperative Extension staff. The Princeton Review Test Preparatory Company then trained the instructors on how to affectively teach ACT College Entrance Examination Preparatory courses. The A.S.P.I.R.E. extension agents provide the students with a total of 30 hours of ACT entrance examination instruction to help prepare the students for the ACT College Entrance Examination necessary for admittance to an institution of higher learning.

In addition to the examination preparation, the A.S.P.I.R.E. students receive The Princeton Review Study Manual, The Princeton Review Practice Question Book, which includes over 1200 ACT practice examination questions, and four full length ACT diagnostic examinations, with a full score analysis and breakdown including students' composite, reading, writing, mathematics, and science scores. The students also receive the Princeton

Review Selective College Admission Booklet and online access to The Princeton Review materials to further help prepare for the ACT College Entrance Examination.

By design, the A.S.P.I.R.E. program bridges the ACT college entrance examination score gap between students from rural, socioeconomically distressed counties and the scores of their urban counterparts. Improving the college entrance examination scores of these students will in turn increase their likelihood of admission to a land grant university to which they apply and the opportunity to obtain a degree in agriculture or a life science. Increasing the number of students with post-secondary degrees in agriculture is crucial to filling the ever-increasing deficit of individuals with an agricultural degree in the United States.

Materials and Methods

Students from 34 counties participated in the A.S.P.I.R.E. program from 2013 to Spring 2016. Four hundred and seventy-one students (n=471) from these 34 counties completed the 10 weeks of ACT test preparation taught by the A.S.P.I.R.E. agents. Throughout the course the students received a total of 30 hours of ACT test preparation in these five subject areas: reading, writing, english, math, and science. In addition to test preparation, students were also provided with four full-length ACT practice exams. The scores of the students were recorded after each testing. The first practice exam (pre-test) was administered prior to the students receiving any ACT test preparation. The second practice exam was administered after the students received ten hours of ACT preparation instruction and the third practice exam was give after 20 hours of ACT preparation instruction. The final practice exam (post-test) was given to the participants after they received the total 30 hours of ACT preparation instruction. The A.S.P.I.R.E. students were allotted four hours to complete each practice test, which were administered on Saturday mornings to simulate real

ACT examinations. The A.S.P.I.R.E. students completed their examinations on a Scantron® sheet and the A.S.P.I.R.E. agents submit the Scantrons® to the Princeton Review Inc., where the examinations are scored and returned to the A.S.P.I.R.E. agents for distribution to the participants. The student's scores from the four ACT examinations were then analyzed using the Correlation procedure, which measures the linear relationship between two variables. Means were separated using the Mixed procedure function which fixes mixed linear models to data so these fitted models to make statistical inferences about the data using a level of significant of ($P < 0.01$) to indicate significant differences between means.

The students' scores per section: english, math, reading, and science, as well as their composite scores were recorded in Microsoft Excel and were also evaluated through SAS program 9.2. The Means procedure function, which can rapidly and efficiently analyze the values of numeric variables, was used to determine the mean scores of all students for each test section and the overall composite score. The Glimmix procedure function, which fits linear mixed models to tests scores with effects for 10 hours of ACT instruction, 20 hours of instruction, and 30 hours of instruction, was used to analyze the mean composite scores for the pre-test, test two, test three, and the post-test. In addition, Glimmix procedure was used to compare the mean scores of each test to one another. The Frequency procedure function was used to evaluate the frequency of students who attended a four or two-year institution after participation in the A.S.P.I.R.E. program.

Results

It should be noted that due to the 2015 changes to the scoring system of the ACT writing section, and the fact that the section remains optional to test takers, the writing scores were not analyzed in this paper. Since 2013, n=471 students from n=34 counties have

participated in the A.S.P.I.R.E. program to date. The majority (74.31%) of students to complete the program, n=350, were from rural counties in North Carolina. Similarly, the majority (79.41%) of counties who participated, n=27, were considered rural counties. The mean scores per test occasion were compared consecutively. As to be expected, the pre-test scores were the lowest and the post-test scores were the highest (Table 4). In addition to there being a highly significant difference between mean composite scores as the test occasions progress (Table 4), the mean composite scores and section scores increased significantly from the pre-test to the post-test (Figure 2).

Figure 3 displays the individual mean subject scores across the four testing occasions. R^2 values show the proportion of variability among test score averages that can be explained by a line, the closer the value is to one, the stronger the linear relationship. It should be noted that these R^2 values denote the variation among average student scores, not individual student scores. Zero hours of instruction is the pre-test score, 10 hours is the test 2 score, 20 hours is the test 3 score and 30 hours is the post-test score. English scores showed a spike after 10 hour of instruction and had an R^2 value of .63 (Figure 3A). Reading scores also displayed a spike in mean score after 10 hours of instruction but decreased linearly after 10 hours with an R^2 value of .09 (Figure 3B). Math scores increased linearly from 0 to 30 hours of test preparation with a high R^2 value of .99 (Figure 3C). Science scores decreased after 20 hours of instruction and had an R^2 value of .33 (Figure 3D).

Students who continued on to post-secondary education were further evaluated. N=78 students were tracked further to determine post-secondary education attendance. Table 5 shows the frequencies at which students chose to further their education. N=29 (37.18%) did not further their education past a high school diploma. Of the students evaluated, N=31

(39.74%) chose to further their education at a four-year institution, while the remaining 18 students (23.07%) continued their education at two-year institution.

Discussion

The comprehensive goal of the A.S.P.I.R.E. program was to bridge the deficit between rural students ACT scores, and those of their urban counterparts. Some literature suggests that recruitment resources should be focused on urban students (Esters and Bowen, 2004). However, in a quote from Dr. D. Clayton “I look for students from rural communities due to their work ethic.” The A.S.P.I.R.E. program provides a low-cost ACT preparation course to socioeconomically stressed, rural students who are often already pre-disposed to agriculture.

The ACT is divided into five sections, four of which are analyzed in this paper. The english section tests grammar, punctuation, sentence structure and rhetorical skills. The reading section contains four passages for the students to read and 10 questions per passage. The math section covers algebra I and II, geometry and some trigonometry. Finally, the science section contains questions on science-based passages presented with graphs, charts, tables and research summaries.

Dougherty (2010) states that the lack of student preparation begins before high school, especially in students from economically disadvantaged communities. The A.S.P.I.R.E. courses are only offered in NC counties classified as rural, however, students from neighboring urban counties may enroll if they are interested. This supports the fact that nearly 75% of the students who participated in the A.S.P.I.R.E. program reside in rural counties similar to the ones Dougherty (2010) refers to. Laing et al (1987) found that students who took more coursework scored higher on the corresponding ACT section,

especially in the math and science sections. Interestingly, as noted by the R^2 values, the majority of the variation in mean english and math scores was due to the hours of instruction the students received. The mean math scores support Laing et al's (1987) findings, the mean science scores do not. Bogan et al (2012) found that schools in socioeconomically challenged communities are often the same schools that neglect the teaching of science because it is not a high stakes testing subject. Kenny (2012) goes on to further explain that teachers don't feel comfortable teaching science because of their general lack of knowledge in the subject, identifying that the issue of poor science scores may begin with the system, not the students.

Conversely, the hours of instruction the students received had little effect on mean science scores and almost no effect on mean reading scores. The Carnegie Council (2010) notes that there has been a decrease in reading and writing skills amongst adolescents since No Child Left Behind was enacted. The Council states further that students in primary grades have a strong reading base but providing literacy support to students after primary school is more difficult because the students require a higher ability to synthesize information from the text. The mean reading scores are effected least by the hours of instruction, with an R^2 value of .09485. This could be due to a multitude of factors, including that secondary schools require students to read unfamiliar text and comprehend new words, facts and ideas, as well as analyze, critique and summarize what was learned in the text (Carnegie Council, 2010).

The Princeton Review® offers ACT preparation classes online as well as in-class on its website. For an equivalent number of hours that the A.S.P.I.R.E. program offers, the cost of private tutoring would be \$3,000+, with the guarantee that your test score will increase by

one point. Students who participate in the A.S.P.I.R.E. program are increasing their scores by nearly two points, in addition to receiving \$100 refund of the initial \$150 upon the completion of the course.

Summary

The decline in enrollment in high school agricultural programs is a major cause for concern for the agricultural field. Many students from rural, agriculture producing counties who are often predisposed to agriculture do not have the grades or test scores to gain acceptance to a research one university and graduate with a degree in agriculture. While on the other hand, many students from urban counties who do have the scores, lack the interest in or knowledge of what a degree in agriculture has to offer. The comprehensive goal of the A.S.P.I.R.E. program is to provide a low-cost ACT preparation class to rural counties in North Carolina to aid students in increasing their scores for admission. The A.S.P.I.R.E. program was successful in significantly improving the mean composite score by 1.87 points ($P < 0.01$), however, it was unsuccessful in increasing scores enough for students to gain acceptance to a top tier research one university.

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Table 4 Mean composite scores compared by test occasion

	Test Occasion				
	Pre-test	Test 2	Test 3	Post-test	PSM*
Mean Composite Score	19.5 ^C	21.3 ^A	20.9 ^B	21.3 ^A	0.2

*Pooled Standard Error of the Means

A,B,C denotes (P<0.01)

Table 5 Frequency of higher education attendance after A.S.P.I.R.E.

Program	Frequency	Percent
High School	29	37.18
Two-year	18	23.07
Four-year	31	39.74

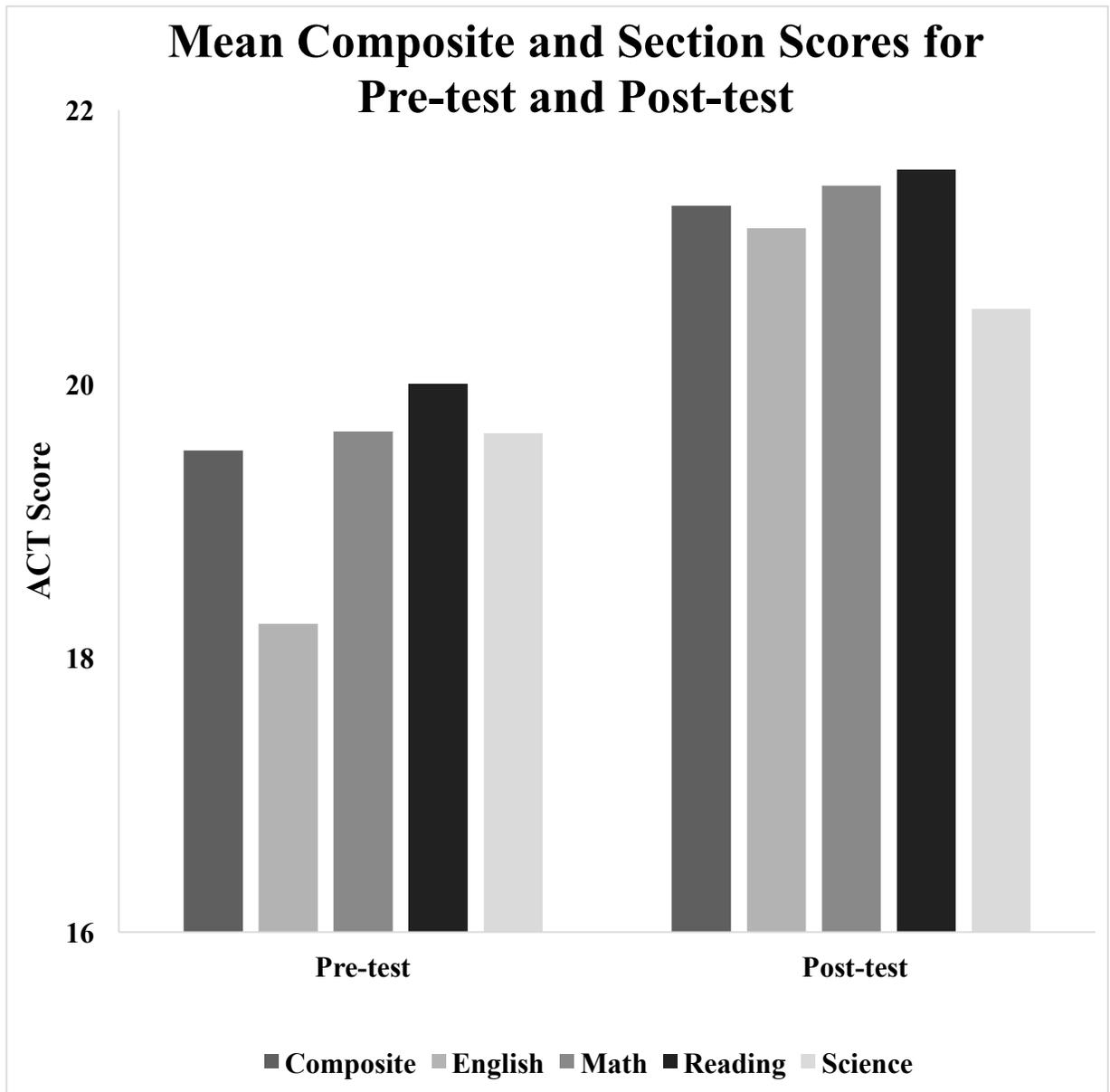
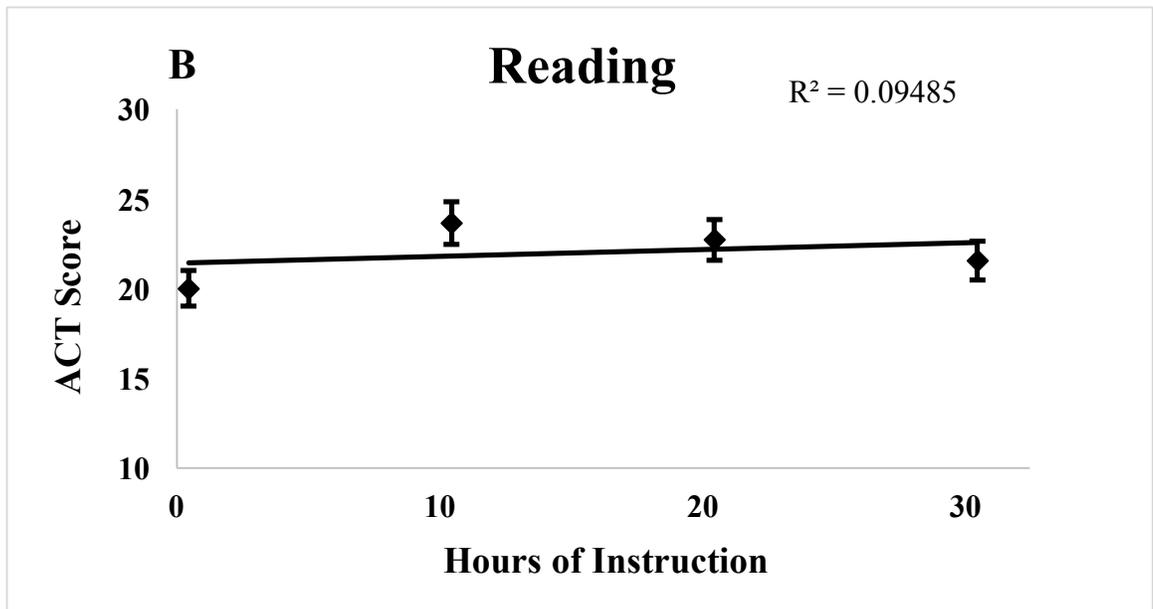
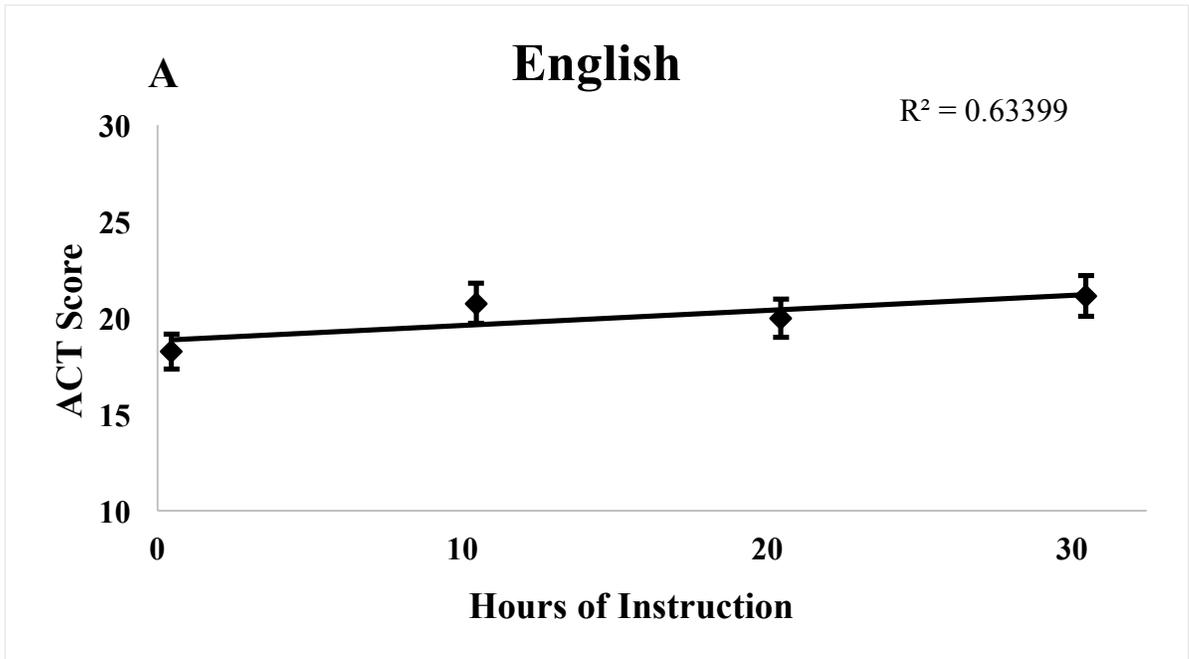
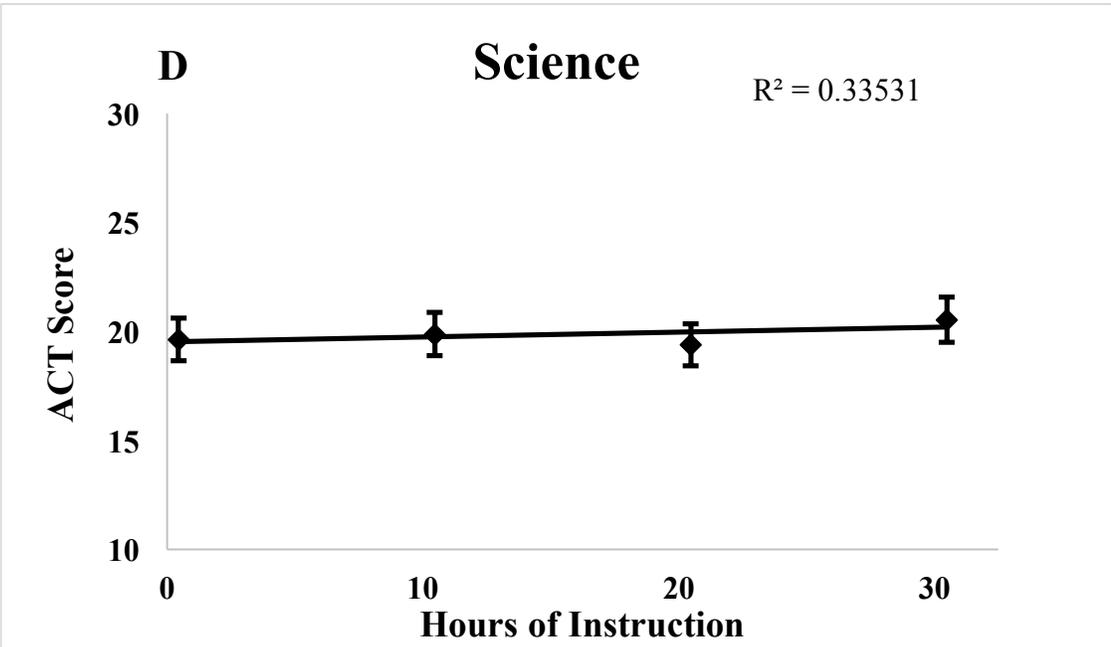
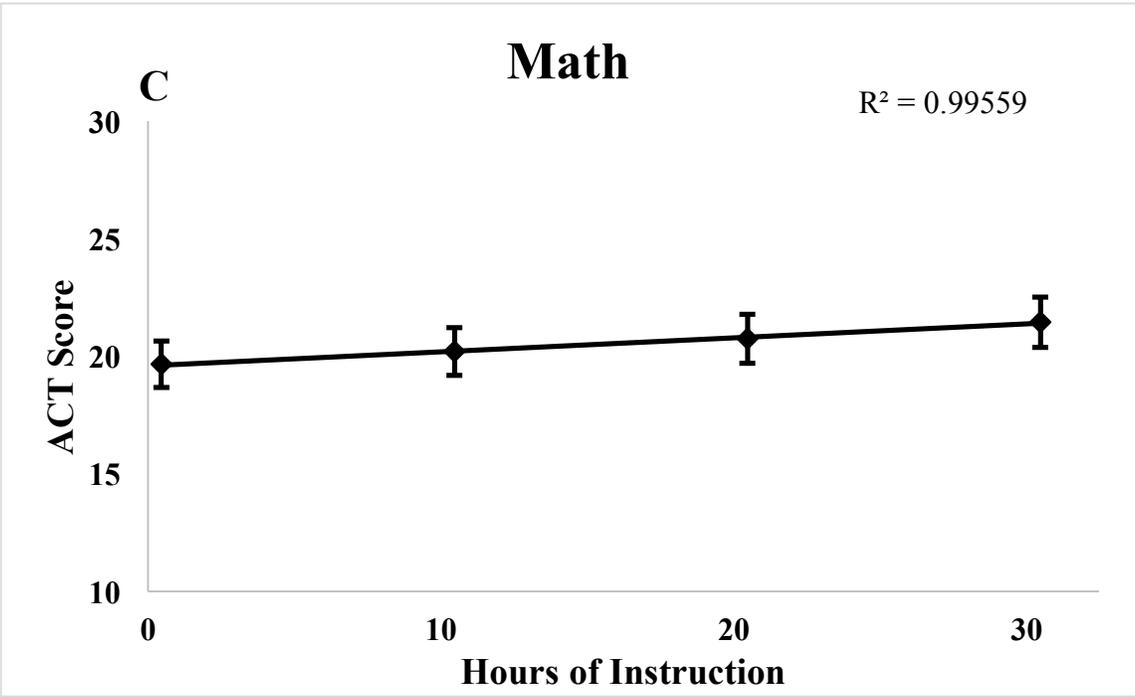


Figure 2 Mean pre-test and post-test composite and section scores

Figure 3A-D Individual Mean Subject Scores





APPENDICES

Appendix B – 2016 North Carolina Tier Map

