Agricultural Experiences and Factors of Undergraduates Who Enroll in a College of Agriculture

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Abstract

Industry partners and College of Agriculture, Food and Environmental Sciences (CAFES) faculty have observed students entering the college possessed fewer agriculture experiences and skills than their predecessors. They have also lamented the increasing pressure to develop industry-ready students, when the gaps are ever wider between their experience and skills entering college and what are required upon graduation. During the 2011 spring quarter, all CAFES students (*N* = 3,366) were sent an electronic survey that resulted in 911 responses (27% response rate). Three quarters of the students were female and one third were seniors. Prior to enrolling at the university, 34% had the opportunity to enroll in secondary agriculture courses but only 25% actually did enroll. Of those who enrolled in secondary agriculture courses, 15% enrolled all four years of high school. Only 28% were raised in a rural setting, with 12% on a farm and 12% on a ranch. When asked to identify what or who influenced their decisions to enroll in a CAFES major, the leading factor was parent(s), followed by a campus visit. Despite CAFES' large enrollment, former FFA and 4-H members are a minority, even with the work these organizations do to prime students for careers in agriculture. Recommendations to increase enrollment of students with agricultural experiences and skills include: encouraging students to attend campus events early in their secondary careers to capture interest and foster relationships, charging university faculty to attend local meetings and visit programs on their travels and crediting experiences and skills gained through organizations such as FFA and 4-H on admission metrics to ensure students entering CAFES have valuable experiences and skills to build upon.

Introduction

California agriculture is a billion-dollar industry relying heavily on colleges of agriculture to produce industry-ready graduates. Problem solvers and critical thinkers with agriculture-specific skills are required to solve tomorrow's problems (Goecker et al., 1999), while producing food and fiber as efficiently as possible. Academic leaders must look ahead to determine if colleges of agriculture are poised to help industry fill these positions.

There were 1,789,772 students enrolled in 1,304 California high schools during the 2011-2012 academic year (California Department of Education, 2012), with over 300 of these high schools offering agricultural education programs and serving over 70,000 students. Despite providing opportunities for secondary students to learn about and develop skills in agriculture, there are many high schools without agriculture programs, leaving nearly 1,000 high schools and 1.7 million students with no access to formal agriculture instruction during their high school experience. Many of the state's 59 counties have a 4-H program offered through their county extension offices, providing non-formal opportunities for students to develop their interest and skills in agriculture. Even with 4-H having a larger reach than high school agriculture programs, it should be noted not all 4-H programs offer agriculture topics and the curriculum and quality of agriculture programming can be uneven among clubs.

In 2011, California Polytechnic State University, San Luis Obispo's (Cal Poly) College of Agriculture, Food and Environmental Science's (CAFES) had an enrollment of 3,366. Both agriculture industry partners and CAFES faculty have observed the students entering CAFES possessed fewer agriculture experiences and skills than their predecessors. They have also lamented the increasing pressure to develop industry-ready students when the gaps are ever wider between their experiences and skills entering college and what are required upon graduation. This situation has faculty and industry wondering if experience and skill level prior to entering CAFES should have greater value on admissions applications.

The bulk of the current admittance system for Cal Poly specifically considers secondary school cumulative GPA, coupled with scores on SAT and/or ACT. The factors of work experience and leadership experience

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are simply yes/no boxes requiring no detail or statement about level of accomplishment. In addition, students applying to Cal Poly must apply to a specific major as there is no general studies option. Students are either accepted or denied into that specific major.

The Agricultural Education and Communication Department's Advisory Committee prompted the study. The purpose of this study was to determine the agricultural and leadership experiences current CAFES undergraduates possessed prior to enrolling in CAFES and determine what influenced students to enroll in a CAFES major. Specific objectives were to determine:

- Was agriculture coursework an option at the high school they attended?
- If so, who enrolled in high school agriculture programs and to what extent?
- Who and what influenced their decisions to enroll in a CAFES undergraduate program(s)?
- What experiences did these students have with the college prior to enrolling in CAFES' undergraduate program(s)?

Conceptual Framework

Researchers have investigated what students identify as factors in their decision to enroll in a college of agriculture. Wildman and Torres (2001) collected data related to five influential categories: agricultural exposure, family and friends, college of agriculture recruitment activities, professionals and job considerations. The agriculture industry experiences and FFA and 4-H experiences students had prior to post-secondary enrollment were the highest ranked factors influencing selection of major. These findings support the work conducted by Dyer, Lacey and Osborne (1996). Students with exposure to agriculture at the secondary level were more inclined to enroll in an agricultural major at the post-secondary level than students with no exposure. Furthermore, students with agricultural experiences were more likely to successfully complete a degree program in agriculture (Dyer et al., 1999; Smith et al., 2010). Rayfield et al. (2013) examined the decision to enroll in agricultural majors and identified parents as having the greatest influence. They also found scholarships and visits from university personnel to be effective recruitment measures.

Terenzini and Reason's (2005) model of influences on a first year college student, as operationalized by Smith et al. (2010), served as the frame for this study. The model identifies a series of influential factors, divided into three main categories: pre-college characteristics and experience, the college experience and outcomes. Although students in this study experienced factors related to each of the three categories, this study focuses on their pre-college experiences. The pre-college category addresses demographics, academic preparation and performance and personal and societal experiences. Students entering a university come from a variety of backgrounds and possess a variety of experiences. These factors significantly impact a student's growth and interactions at the post-secondary level (Terenzini and Reason, 2005). To adequately examine the student population entering CAFES, their formative experiences prior to enrollment must be addressed.

Methods

The researchers developed an instrument aligned with the purpose and objectives based on prior research completed at the University of Idaho (Lancaster et al., 1990). The departmental advisory committee served as the panel of experts to confirm face and content validity, doing so at the winter departmental advisory committee meeting in January of 2011. The instrument was amended accordingly and the researchers acquired human subjects' approval through the university's research and graduate program.

Upon approval, www.surveymonkey.com was utilized to develop the online survey instrument. The instrument was pilot tested with agricultural education graduate students (N = 14) during the beginning of the 2011 spring quarter. Several online instrument glitches were identified and addressed. The instrument was finalized to acquire the desired data from the frame. The online instrument was sent to all 3,366 CAFES students during the second half of the 2011 spring quarter. Dillman's (2007) online survey methods were followed, resulting in 911 CAFES student responses with a response rate of 27%, similar to other research using online survey methods (Fraze et al., 2003).

Results

Seventy-three percent of the participants were female (529 of 717) while 27% were male (198 of 717). Of those that responded, only 707 indicated their current academic standing: 32% were seniors (n = 225), 24% were juniors (n = 167), 17% were freshmen (n = 119), 15% were sophomores (n = 106) and 12% (n = 90) were super seniors (beyond their 4th year in bachelor's program).

Thirty-four percent (311 of 911) of respondents indicated they had the opportunity to enroll in secondary agriculture courses but only 25% (228 of 911) indicated they enrolled. Participants were asked to identify all of the pathways in which they took courses, thus the total number of enrollees is greater than those responding. Agri-Science and Animal Science were the most popular course pathways (over 14% each). Agricultural Mechanics and Agri-Business were followed most closely at over 8% each. It appears the least popular course pathways were Ornamental Horticulture (6.5%), Plant and Soil Science (5.0%) and Forestry and Natural Resources (2.6%). However, if combined as plant related topics, the popularity rises to 14.1% and reaches a rate similar to Agri-Science and Animal Science totals. Table 1 delineates the secondary agriculture course pathways in which students enrolled.

Table 1. Course pathways of those students enrolled in secondary agriculture (n = 228; N = 911)

Secondary Agriculture Course Pathway	f (%)
Agri-Science	130 (14.3)
Animal Science	129 (14.2)
Agricultural Mechanics	76 (8.3)
Agri-Business	74 (8.1)
Ornamental Horticulture	59 (6.5)
Plant and Soil Science	46 (5.0)
Forestry and Natural Resources	24 (2.6)

Table 2. Years students enrolled in high school agriculture classes (N=911)

# of Years of High School Agriculture Enrolled	f (%)
4 Years	139 (15.3)
3 Years	22 (2.4)
2 Years	31 (3.4)
1 Year	32 (3.5)
None	687 (75.4)

Table 3. Agriculture experiences prior to enrolling at Cal Poly (n=875; N=911)

Agriculture Experiences	f (%)
Raised in a rural setting	244 (27.9)
FFA member	189 (21.6)
4-H member	171 (19.5)
Grew up on a farm	110 (12.6)
Grew up on a ranch	102 (11.7)
Farm Bureau member	46 (5.3)
Grange member	5 (0.6)

Table 5. Family members who have attended Cal Poly (n = 734; N = 911)

Family Member	f (%)
None	403 (54.9)
Cousin	127 (17.3)
Father	97 (13.2)
Uncle	95 (12.9)
Aunt	75 (10.2)
Mother	75 (10.2)
Brother	74 (10.1)
Sister	71 (9.7)
Grandparent	26 (3.5)
Spouse	2 (0.3)

Note: Multiple responses allowed.

Table 6: On-campus experiences prior to enrolling at Cal Poly (n = 730; N = 911)

On Campus Experiences	f (%)
Took a campus tour	385 (52.7)
Attended Cal Poly's Open House	374 (51.2)
Visited friends and/or relatives on campus	264 (36.2)
Attended a Cal Poly Preview Day	207 (28.4)
Attend a Field Day on campus	93 (12.7)
Attended a Cal Poly athletic event	89 (12.2)
None of the Above	84 (11.5)
Attended a sports camp on campus	24 (3.3)
Met with an Agriculture Ambassador	19 (2.6)
Attended a Cal Poly Teach Ag Day	10 (1.4)

Note: Multiple responses allowed.

Table 4. Levels of influence on decision to enroll in agriculture major at Cal Poly (n = 734; N = 911)

Individual and/or Experience	Very Much	Substantial	Some	Little	None	M
Parent(s)	171	159	126	61	217	2.01
Visit S.L.O. campus for activity	125	107	106	48	348	1.47
Other relative(s)	82	114	108	72	358	1.30
Friend(s)	56	112	140	88	338	1.26
Past Cal Poly student	89	104	70	52	419	1.17
Current Cal Poly student	54	99	122	65	394	1.11
Agricultural education instructor	114	59	38	32	491	1.01
Cal Poly literature	30	89	138	66	411	0.99
Other high school instructor(s)	39	66	76	57	496	0.76
High school science instructor	29	57	77	66	505	0.69
High school counselor	30	50	75	75	504	0.67
Sibling	40	44	67	54	529	0.65
4-H leader	45	33	37	32	587	0.52
Visit from a CAFES professor	14	27	23	21	649	0.28
Personal letter from a CAFES professor	8	19	20	21	666	0.20
Visit from an Ag Ambassador	6	17	16	18	677	0.17

Note: Level of Influence Scale is 4 = Very Much Influence, 3 = Substantial Influence, 2 = Some Influence, 1 = Little Influence, and 0 = No Influence.

Of the respondents, 75% did not enroll in high school agriculture courses. Fifteen percent of the respondents indicated they were enrolled in four years of high school agriculture, while 3.5% of students were enrolled in only one year of coursework. Similarly, 3.4% of the students enrolled in two years and 2.4% of the students completed 3 years of courses. Table 2 displays the number of years agriculture courses were completed.

Nearly 28% of the respondents indicated they were raised in a rural setting. Related to location, 12.6% grew up on a farm and 11.7% grew up on a ranch. Twenty-one percent of the students indicated they were FFA members and 19% were 4-H members. Only 5% of the respondents reported being Farm Bureau members and less than 1% were members of Grange (a national agricultural organization focusing on community development). Table 3 clarifies the students' experiences prior to enrolling at Cal Poly.

Table 4 ranks the influence of factors on students' decision to enroll in a CAFES major. Students were asked to indicate the level of influence of each factor described as *very much*, *substantial*, *some*, *little* or *none*. The leading factor influencing a student's decision to enroll was their parent(s). The next highest ranking factor was visiting campus, followed closely by the influence of other relative(s) and friend(s). It is interesting to note 173 students indicated their Ag Ed instructor's influence to enroll in a CAFES major was *very strong*. Receiving visits from Ag Ambassadors and receiving a letter from a faculty member were at the bottom of the list.

The majority (55%) of respondents had no family members attend Cal Poly. Those who did were ranked as follows: cousin (17%), father (13%), uncle (13%), aunt (10%), mother (10%), brother (10%), sister (10%) and only 4% had a grandparent attend Cal Poly. Table 5 clarifies which family members have attended.

Prior to enrollment, over half of the respondents took a campus tour and/or attended the campus-wide Open House (see Table 6). One third of the students visited friends/relatives on campus. Almost 30% attended a prospective student Preview Day, while only 12% attended an FFA field day or attended a home athletic event any time during the year.

Discussion

Sixty-six percent of the respondents did not have access to secondary agriculture courses, yet still decided to enroll in a CAFES major. This finding is similar to previously conducted research in colleges of agriculture across the country (Rayfield et al., 2013; Smith et al., 2010; Wildman and Torres, 2001). Thirty-four percent indicated they had the opportunity to enroll in secondary agriculture courses, yet only 25% of the respondents enrolled. This leads one to question why nine percent of the respondents chose not to enroll in an available secondary agriculture course when they were heading to college to major in agriculture. Perhaps the instruction or content was not challenging or there was pressure to take other courses to better prepare them for testing or that would be more attractive to admissions officers. These questions are beyond the scope of this study but should be further pursued.

In regard to how many years students enrolled in secondary agriculture courses, there was little difference in enrollment frequencies among years one, two and three. However, there were five times more students completing all four years of an agriculture program which illustrates that, in most cases, students who can get into a CAFES major can fit four years of high school agriculture coursework into their schedules. Studying what these program completers took in terms of courses, coupled with test scores and GPA, would also be worthy of study.

When looking at who/what influenced these students to enroll in a CAFES major, parent(s) were named as the leading influence (Rayfield et al., 2013). A visit to campus was the second most influential, followed closely by other relative(s) and friend(s). It should be noted, 114 of the 189 participants who had been FFA members responded their agriculture teachers *very muc*h influenced their decision to pursue a CAFES major. When looking at low ranking factors it is important to note the respondents were not asked if they encountered these activities, merely if they were influential. Factors might have been ranked low because they seldom occur and cannot be considered influential. These included a CAFES professor visiting high schools and the professor writing a personal letter to a student. The Ag Ambassador's program budget has been reduced greatly over the past decade making visits nearly impossible. This situation might explain why this is the lowest ranking factor.

Despite the long-standing reputation as a large and prominent college of agriculture, 55% of the respondents had no family members attend Cal Poly. Respondents reported 13% had fathers and 10% had mothers attend Cal Poly. Only 3.5% of the students' grandparents attended. Perhaps there is little tradition between generations, which may not generate much loyalty or support.

In regard to students having on-campus experiences prior to enrolling at Cal Poly, half of the respondents indicated they took a campus tour and attended the annual Open House. One third of the students also visited friends or relatives on campus. Even in an increasingly digital age, direct contact with the campus environment is an important factor related to college decision. Pre-college experiences are foundational elements to students' decisions of college major choice (Terenzini and Reason, 2005). Considering the responses of the students and gleaning over the data, the following recommendations and implications have been developed.

Recommendations and Implications

In the secondary academic population, agriculture education comprises a small piece of the pie (California Department of Education, 2012), yet this subset serves a billion-dollar industry. The agriculture industry requires a workforce in possession of a thorough understanding of the many unique challenges facing agriculture (Goecker et al., 1999). The concerns university faculty has about the lack of agricultural experiences held by incoming university students (Dyer et al., 1999; Smith et al., 2010) and the charge given by the local advisory committee, indicate the need to know more about the factors forming a student's decision to enroll in college.

The CAFES students surveyed in this research project indicated elements as influential and successful in helping them find their way to a major within the college of agriculture (Terenzini and Reason, 2005). After analyzing the data, the researchers identified specific groups with whom the college maintains open communication. To seek the greatest recruitment impact, the researchers targeted those groups indicated by the survey population as influential and generated the following action plan. Those groups include: agriculture instructors, 4-H agents, volunteers, university agriculture faculty and staff and college of agriculture outreach staff.

To agriculture instructors and 4-H agents and volunteers:

- Recruit and encourage more students to take part in the program by focusing on career opportunities in agriculture.
- Offer wider opportunities beyond traditional livestock projects.
- Help students experience on-campus events like Open House, Preview Day, field days, etc.
- Introduce students to faculty and staff in their areas of interest during their freshman year to encourage good habits and focus on a goal early.

To university agriculture faculty and staff:

- Communicate with secondary agriculture teachers and 4-H agents about the knowledge and skill set(s) students need prior to leaving the secondary level to be functional and successful at the university.
- Intentionally visit local programs and attend meetings, followed up with personal letters to

encourage and support students with an interest in agriculture.

To college of agriculture outreach:

- Communicate with parents and counselors about the agricultural leadership and experiential opportunities in CAFES.
- Invite students and their families to campus for a visit. If a visit is not possible, produce short videos featuring the agricultural opportunities and what it takes to thrive in the CAFES environment. In videos, make suggestions about how prospective students can prepare to enter the CAFES environment (other formal coursework, leadership development and experiential learning opportunities).
- Make sure CAFES freshmen are happy to ensure their contact with prospective students from their home high schools is positive, serving as a natural recruitment tool.
- Consider the resources devoted to Agriculture Ambassadors and the return on investment. Many students reported having no real interaction with them. Who do ambassadors serve? What is their purpose? How can their role be maximized to better impact potential students?

While every high school student must have an equitable chance toward admission into CAFES, faculty members are frustrated with current students who come in with a lessened skill set and limited agricultural experiences. Is this surprising when 75% show up with no formal education in agriculture? There is frustration when students are actively involved in agricultural organizations to prepare for specific CAFES majors yet are not admitted. Rather, they are admitted to other universities, in-state and across the western United States, taking their experiences and skills with them. To better serve the agriculture industry, CAFES needs to insist specific agricultural work and leadership experience(s) be added to the current metrics of admissions selection criteria.

Further research should address the following:

- Ascertain from CAFES faculty and staff the perceived skill level of their students and identify skill gaps, cross-referenced with industry expectations.
- How leadership skills are demonstrated within CAFES and across campus.
- How leadership development experiences prior to enrolling in CAFES prepare students to excel in leadership on campus.
- How former 4-H and FFA members contribute in CAFES when compared to non-members.
- Determine what, if any, recruitment efforts students experience.

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