Teaching Methods

Factors Affecting Recruitment of Horticulture Students at Major Universities

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SUMMARY. Researchers at the University of Florida and Texas A&M University developed a survey to gain insight into demographic and educational influences on undergraduate students who major in horticulture. Five universities participated in the study of undergraduate horticulture programs. These included the University of Florida, Texas A&M University, Oklahoma State University, University

of Tennessee, and Kansas State University. About 600 surveys were sent to schools during the 1997 fall semester. The questionnaires were completed by horticulture majors and nonmajors taking classes in horticulture departments. The survey consisted of two main sections. The first section, which was completed by all students, explored student demographic information, high school history, university history, and horticulture background. Only horticulture majors completed the second section, which examined factors influencing choice of horticulture as a major. Statistically significant differences were found between horticulture majors and nonmajors when comparing the two groups on the variables of transfer status, gardening experiences, and the importance of gardening. There was a significantly higher percentage of transfer students among horticulture majors. The decision to major in horticulture occurred somewhat early in academic programs, with the largest representations in high school or early in college. Overall, majors had more gardening experience than nonmajors and considered the hobby of gardening as a strong influence in choosing their major. This information should be considered in recruitment efforts since students reported that this interest fostered in them a desire to pursue horticulture as a major. School garden programs at the primary level and horticulture classes at the high school level could possibly influence more students to choose horticulture as a major at the college level. Currently, trends in recruiting efforts in academic programs at the university level are intense and competitive, as students are given more and more career option information. Consequently, data from this study may be useful for horticulture departments developing targeted recruiting programs.

The horticulture industry, which includes the production, design, and maintenance of plants for aesthetic and utilitarian purposes, is the direct result of people's affection and need for plants. Job opportunities and the consequential demand for horticulture professionals are the factors that have elevated horticulture into a leading academic area in collegiate agriculture programs throughout the United States.

At the postsecondary education level, horticulture programs are offered throughout the United States at 114 colleges and universities involving about 5,500 students (American Society for Horticultural Science, unpublished data). These institutions are responsible for preparing students for varied careers in horticulture including fruit and vegetable production, ornamental plant production, and the turfgrass, landscape, and floriculture industries.

Horticulture is deep-seated within the American culture with about one-quarter of Americans practicing some form of gardening (Roper Reports, 1997). Unquestionably, society has a strong affection for nature and plants, contributing to a strong horticulture industry. The commercial worth of horticultural plants is well known. The United States' green industry (floriculture and ornamental horticulture) is the fastest growing agricultural sector in grower cash receipts, with an average annual growth rate of 9% (Johnson and Johnson, 1993). The ornamental horticulture and floral industries represent nearly 10% of all crop agriculture—ranking ahead of wheat (*Triticum aestivum* L.), cotton (*Gossypium hirsutum* L.), and tobacco (*Nicotiana tabacum* L.) (Society of American Florists, 1996). In Florida alone, ornamental plants constitute the leading agricultural commodity with a value of nearly \$42.2 billion (Hodges, 1989). Consequently, the horticulture industry is in an enviable position of marketing a product that is of significant economic importance.

No known statistical data has been compiled and analyzed to document possible variables influencing horticulture student enrollment and its fluctuations. As many departments are turning to recruiting efforts to increase student enrollment, no current research exists documenting factors and demographic variables that may influence the student making horticulture a

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choice for academic pursuits.

Research has shown that environmental factors have influenced people's awareness of and subsequent interest in career options (Cooper-Marcus, 1974; Tanner, 1980). Tanner (1980) and Cooper-Marcus (1974) found that individuals who had childhood interests in outdoor activities such as fishing, hunting, and bird watching usually became involved in nature conservation or landscape architecture as adults. Unfortunately, in the horticultural sciences, research has not been completed to document if specific variables such as gardening as a child or participation in 4-H programs affect the choice of horticulture as a major and ultimately as a career. Consequently, a research initiative is needed to clearly document these factors and the influence of demographic variables on students' choice of college major of study.

The primary goal of this research was to determine information that may

help universities understand their student's motivations for academic pursuits to ultimately enhance recruitment into horticulture. The objectives of this study were to determine 1) the demographic background students that decide to major in horticulture have in comparison to nonhorticulture majors, 2) the educational status of students entering horticulture programs compared to nonhorticulture majors, 3) if past horticultural experiences play a role in choice of majors for college students, and 4) when most students choose horticulture as a major and the primary outside influences that help them make this decision.

Materials and methods

In 1997, five departments of horticulture, the University of Florida, Texas A&M University, Oklahoma State University, University of Tennessee, and Kansas State University participated in an evaluation of their student popula-

tion. A survey was developed and pilot tested at the University of Florida and at Texas A&M University in spring, 1997. The survey was refined and distributed by the five departments during the fall semester, 1997. Six hundred surveys, along with instructions and a postage-paid return envelope were mailed to participating departments and administered to majors and nonmajors in horticulture classes. All students were degree seeking, with nonmajors representing a variety of agricultural and nonagricultural majors. Of these questionnaires, 315 individual surveys were returned, for a return rate of 53%, representing 156 majors and 159 nonmajors from the five participating universities.

The survey consisted of four sections: student information, university history, horticulture background, and factors influencing horticulture as choice of major. Student information included general demographic data such as gender and ethnicity. The university history

Table 1. Relationships of demographic variables and college student horticulture majors and nonmajors.

Variable	Major		Horticulture (no.)	Nonhorticulture (%)	Statistical difference
	Horticulture (no.)	Nonhorticulture (%)			
Gender					0.194 ^z
Male	85	54.5	75	47.2	
Female	71	45.5	84	52.8	
Ethnicity					0.116 ^y
Caucasian	148	94.9	145	91.2	
African American	0	0.0	1	0.6	
Hispanic	4	2.6	3	1.9	
Asian	0	0.0	5	3.1	
Native American	4	2.6	2	1.3	
Other	0	0.0	2	1.3	
Age					0.526 ^y
18–20	66	42.3	68	42.8	
21–23	64	41.0	74	46.5	
24–26	9	5.8	8	5.0	
27–30	6	3.8	6	3.8	
31–35	5	3.2	1	0.6	
36–40	2	1.3	0	0.0	
41–45	2	1.3	1	0.6	
≥46	2	1.3	1	0.6	
Marital status					0.541 ^z
Married	18	11.5	15	9.4	
Single	136	87.2	142	89.3	
High school grade					0.166 ^y
95–100	31	20.1	51	32.1	
90–94	38	24.7	39	24.5	
85–89	44	28.6	40	25.2	
80–84	28	18.2	21	13.2	
75–79	11	7.1	6	3.8	
≤74	2	1.3	1	0.6	

^zR_{phi} correlation coefficient.

^yCramer's V correlation coefficient.

section explored student status, including transfer versus freshmen entrance as well as student residency status. The horticulture background section surveyed students about gardening experience and the value of gardening to the participating individual. The fourth section contained questions evaluating when students made the decision to major in horticulture as well as the external influences on the decision making process.

All data were analyzed using the Statistical Package for the Social Sciences for Windows release 7.0 (SPSS, 1997). Data were entered into SPSS spreadsheets. During statistical analysis, any missing answers to survey questions were coded as missing values. Descriptive statistics such as frequencies and percentages were calculated for all variables of interest. Additionally, chi-square analyses were completed for areas of specific interest.

Results and discussion

OBJECTIVE 1: DETERMINE WHAT DEMOGRAPHIC BACKGROUND STUDENTS THAT DECIDE TO MAJOR IN HORTICULTURE HAVE IN COMPARISON TO NONHORTICULTURE MAJORS. Demographic information among university students has been changing for at least the past four decades (Astin, 1998). One of the most obvious changes during this time has been an increase in the number of women pursuing advanced degrees today compared to the 1960s (67% compared to 40.3%). Women have also been choosing different career paths from those chosen in the 1960s, including those in medicine, law and business compared to teaching and the arts in the past (Astin, 1998). In the past 20 years, the number of minority (Asian, Hispanics, African Americans and Native Ameri-

cans) undergraduate students has increased substantially (Pascarella and Terenzini, 1998). Because of these changing demographic trends, a demographic information section was included in the survey to investigate the population of students included in this study.

Results indicated that for nonmajors, 47.2% were male while 52.8% were female (Table 1). For horticulture majors, 54.5% of the respondents were male, while 45.5% were female, indicating no statistical significant differences between the two groups. This information corresponds with results from the Cooperative Institutional Research Program (CIRP) which found that the percentages of women entering college since 1966 have gradually switched from a minority of 45.7% to a majority of 55.3% (Astin, 1998). This comparison information from the CIRP shows that the horticulture departments in this study are, perhaps, underrepresented in terms of percentages of women within the departments. The 30-year CIRP trend reported that gender differences for many career interest areas had been eliminated and that there has been a convergence of male and female interests (Astin, 1998).

In addition to gender issues, another area that has received a great amount of attention within higher education institutions throughout the country has been the issue of race and diversity. Colleges and universities are taking steps to ensure that ethnic diversity exists within their educational systems (Hurtado et al., 1998; Jackson, 1998). Research supports that diversity within an institution improves the climate by increasing opportunities for interaction across ethnic barriers and by providing more social and cultural experiences for

students (Hurtado et al., 1998; Kanter, 1977).

Results from this study indicated that for nonhorticulture majors, 91.2% of the respondents were Caucasian and of the horticulture students involved in the study, 94.9% were Caucasian (Table 1). This difference between majors and nonmajors was not statistically significantly different. These findings were somewhat discouraging, indicating a definite need for recruitment efforts towards diversity within universities as well as individual horticulture departments. Since 1984, American colleges and universities have witnessed a 61% increase in the total number of Asian, Hispanic, African American and Native American undergraduates compared to 5.1% of Caucasian students (Hurtado et al., 1998). However, the results of this study indicate that the growing number of minority students overall in colleges are not represented in horticulture programs. This could create problems in recruiting students since research has shown that minorities in majority Caucasian environments experience minority status stress (Prillerman et al., 1989; Smedley et al., 1993). Students are less likely to feel comfortable and remain in environments in which they are minorities. However, research indicated that students attending universities where they felt they were valued by faculty and administrators were less likely to report racial-related problems (Hurtado et al., 1998). Clearly, horticulture departments should take steps toward improving departmental climates for diversity by increasing the representation of minority students and ensuring students feel valued in the classroom.

Regarding age and marital status, no statistical differences were found

Table 2. Relationships of educational status and college student horticulture majors and nonmajors.

Variable	Major		Horticulture (no.)	Nonhorticulture (%)	Statistical difference
	Horticulture (no.)	Nonhorticulture (%)			
Transfer status					<0.0001*
No	85	54.5	119	74.8	
Yes	71	45.5	40	25.2	
Residency status					0.160 ^z
In state	131	85.1	145	91.2	
Out of state	20	12.9	12	7.5	
International	3	1.9	1	0.06	

^zR_{phi} correlation coefficient.

^yCramer's V correlation coefficient.

*Statistically significant at *P* = 0.05.

Table 3. Frequencies, percentages and statistical significance results for chi-square analyses of the gardening experience for horticulture majors and nonmajors participating in the study.

Variable	Major		Horticulture (no.)	Nonhorticulture (%)	Chi-square
	Horticulture (no.)	Nonhorticulture (%)			
Have you ever gardened?					<0.0001
No	19	12.2	67	42.7	
Yes, 1–3 years	58	37.2	48	30.6	
Yes, 4–8 years	37	23.7	20	12.7	
Yes, ≥8 years	42	26.9	22	14	

Table 4. Frequencies, percentages and statistical significance results for chi-square analyses of the importance of gardening to horticulture majors and nonmajors participating in the study.

Variable	Major		Horticulture (no.)	Nonhorticulture (%)	Chi-square
	Horticulture (no.)	Nonhorticulture (%)			
How important is gardening to you?					<0.0001
Very important	54	35.3	13	9.4	
Important	58	37.9	48	34.5	
Undecided	27	17.6	49	35.3	
Unimportant	5	3.3	24	18	
Very unimportant	9	5.9	4	2.9	

between horticulture majors and nonmajors (Table 1). For age, the largest groups represented for both groups was in the 18 to 20 and 21 to 23 year old age range, with 83.3% of horticulture majors and 89.3% of nonmajors responding in these categories. Marital status for the groups were also similar. For nonmajors, 89.3% of the students were single, while 87.2% of the majors were single.

The high school grade average for majors showed the strongest percentages in the 85 to 89 grade range, with 28.6% of the students making high Bs (Table 1). For nonmajors, the percentages of high grades were higher, although not statistically. The majority of nonmajors indicated grades in the 95 to 100 grade range (32.1%). There has been a nationwide trend of increasing

grade point averages since 1990. Nearly 32% of college freshmen have A– or better grade averages (Astin, 1998). The percentages of college freshmen with C+ or lower grade point averages have decreased. These higher grades have been contributed to an increase in student competitiveness to get accepted and remain in college programs (Astin, 1998).

OBJECTIVE 2: DETERMINE THE EDUCATIONAL STATUS OF STUDENTS ENTERING HORTICULTURE PROGRAMS COMPARED TO NONHORTICULTURE MAJORS. For recruiting purposes, this survey was used to evaluate the transfer status of students to determine if students were entering programs as freshmen or were transferring later in college, perhaps after completing an Associate of Art degree. In addition, the survey asked respondents

about their place of residence, whether they had in-state, out-of-state, or international status.

The transfer status between the two groups of students was found significantly different with a Phi symmetric measure value of < 0.0001 (Table 2). For nonhorticulture majors, 25.2% of the respondents were transfer students. In contrast, a large percentage of students entering horticulture departments were transfer students, with 45.5% of the students entering the university after completing college courses and, in many instances, completing an AA degree. Research has indicated that 40% of college students nationwide attended community colleges (Pascarella and Terenzini, 1998). These results indicated that horticulture departments are, perhaps, attract-

Table 5. Period in which students decided to major in horticulture for students participating in the study.

Question	Answer	Number	Percent
When did you decide to major in horticulture?	Earlier than high school	1	0.6
	High school	42	26.9
	College		
	Freshman	32	20.5
	Sophomore	41	26.3
	Junior	21	13.5
	Senior	3	1.9
	Other	16	10.3
Total		156	100

Fig. 1. Factors positively influencing horticulture as a choice of major for students participating in the study.

ing more than the national average of transfer students. This may relate to the competitiveness for students entering universities as freshmen, and their desires to pursue high-salaried professional careers.

Regarding residency, 91.2% and 85.1% of the respondents were in-state residents, for nonhorticulture majors and horticulture majors, respectively (Table 2). Consequently, the majority of students were choosing a university that was local or within their state. This was not surprising since in-state tuition costs are generally lower and, therefore, more affordable for students.

OBJECTIVE 3: DETERMINE IF PAST HORTICULTURAL EXPERIENCES PLAY A ROLE IN CHOICE OF MAJORS FOR COLLEGE STUDENTS. A primary focus of this research was to determine what, if any, gardening experience students had before entering college and if these experiences contributed to their choice of major.

The years of gardening experience appeared to have an influence on the choice of major. This variable was found statistically significantly different with a Phisymmetric measure value of <0.0001 (Table 3). In total, 88% of majors had gardening experience

(Table 3), with 26.9% indicating 8 or more years of gardening experience. In contrast, 43% of the nonmajors indicated that they had never gardened versus 19% of majors. For recruiting purposes, targeting schools that already have horticulture or gardening programs might seem worthwhile. It may also be to the advantage of university horticulture programs to invest in support of community and elementary school garden programs, since these may lead, eventually, to prospective students.

There were significant differences in the perceptions of the importance of gardening between majors and nonmajors (<0.0001) (Table 4). To determine the value of gardening to majors and nonmajors, students were asked to rank the importance of gardening on a Likert-type scale (Likert, 1967). Participants ranked the value of gardening from 1 to 5, with 5 representing "very important," 4 as "important," 3 as "undecided," 2 as "unimportant," and 1 as "very unimportant." Not surprisingly, more majors (35.3%) ranked the value of gardening as "very important" compared to nonmajors (9.4%) (Table 4).

OBJECTIVE 4: DETERMINE WHEN MOST STUDENTS CHOOSE HORTICULTURE AS A MAJOR AND THE PRIMARY OUTSIDE INFLUENCES THAT HELP THEM MAKE THIS DECISION. The survey included questions to

determine the period when students made the decision to major in horticulture, whether it was prehigh school, high school, or college. Additionally, information was included that evaluated external influences on the decision to major in horticulture such as parents and family, high school counselors, or college literature.

Regarding the period when students made the decision to major in horticulture, the largest percentage (26.9%) decided as early as high school (Table 5). The next highest percentages decided as college freshmen or sophomores, at 20.5% and 26.3%, respectively. Therefore, recruiting efforts should focus on this early period before college admittance, or perhaps, within lower level university studies. This may help capture the interest of general studies students as well as those who are undecided.

Factors influencing selection of horticulture as a major included various external influences (Fig. 1). Of these, horticulture as a hobby had the greatest influence, with 74.4% of the respondents indicating that this interest in gardening influenced their decision to major in horticulture. In past studies, this exposure to the outdoor environment has been found to influence people's awareness of and subsequent interest in environmental career opportunities (Cooper-Marcus, 1974; Tanner, 1980).

The influence of relatives (nonparental) had a high percentage as well, with 62.2% of the respondents indicating that this group influenced their decision to major in horticulture (Figure 1). Attention should be made to the next highest percentage, which was representative of both parents and students with 53.8%. For recruiting purposes, it is interesting to note that university literature as well as visits from university recruiters had a strong influence for majors, with percentages of 42.9%. It is also interesting to note that while one quarter of students have reported (in the previous section) that they made their decision to major in horticulture in high school, the lowest percentages were for high school influences. High school instructors were rated important by 15.4% of respondents. Similarly, personal influences that occur before college, such as the influences of a FFA leader or a 4-H leader were rated important by only 12.2% and 7.7% of respondents, respectively.

Conclusion

The primary purpose of this study was to determine information that may help universities understand their students and, ultimately, use this information towards strengthening their courses and programs through improvements in teaching and recruitment efforts. Although this study represents only a small portion of the colleges and universities teaching horticulture in the United States, the findings are interesting. Results from the study indicated that there are no demographic differences between majors and nonmajors and supported research from nationwide longitudinal studies of overall college student populations. However, results showed an extremely low minority representation among horticulture majors, which could, perhaps, be seen as an opportunity towards recruitment efforts in this area.

Significant differences were found between horticulture majors and nonmajors on the variables of transfer status, gardening experiences, and the value of gardening. Overall, more majors had transferred into horticulture departments at universities, had more gardening experience than nonmajors, and considered the hobby of gardening as a valuable. This information should be considered in recruitment efforts since students re-

ported that this interest fostered in them a desire to pursue horticulture as a major. Curriculum development, course implementation, and recruiting efforts should all relate directly to current student needs and desires. Findings from this study may prove useful in learning more about horticulture students' interests; ultimately promoting teaching and recruiting efforts better targeted to this student group.

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