Faculty do not perceive financial and prestigious awards as useful means of improving teaching.

There are a number of steps that can be taken to better prepare individuals for the role of college teacher and to support them in that role. Departments can assist faculty, junior faculty in particular, in their efforts to understand and successfully fulfill their roles as teachers and researchers. Faculty should be required to have some teaching methods courses prior to their teaching appointment. These could be courses offered by teachers' colleges or short courses and workshops offered by university instructional resource centers.

Colleges and/or departments need to develop teacher preparation programs for graduate students who have college teaching and research as career goals. Teaching methods courses and workshops should be included in faculty development programs where applicable. They should be required of faculty who have not had comparable work and experiences prior to their faculty appointment. Graduate teaching assistants should be supervised by faculty who are recognized as excellent teachers. Teaching and research should be similarly evaluated and count equally toward promotion and tenure. Teaching needs to be evaluated on a continuing basis and departments should use a combination of teach evaluation methods rather than relying primarily on student evaluation as is the current practice. While financial and prestiguous awards might be appropriate and desirable, it should be recognized that these are not methods of improving instruction.

Two resource documents resulted from the study. These reports entitled, *National Assessment of Faculty Development Needs in Colleges of Agriculture* (Chudzinski, et al.) and *Faculty Development Programs A Literature Review* (Chudzinski, et al.) were sent to all land-grant and AASCARR agricultural deans. Additional copies may be obtained for $10 by writing to the Associate Dean for Resident Instruction, College of Agriculture, University of Illinois, 104 Mumford Hall, Urbana, Illinois, 61801.

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An Evaluation of Students Entering and Exiting Agriculture, Agribusiness, Biology and Chemistry Curricula

Paul M. Walker and J. A. Wood

Abstract

Data collected from 1384 students graduating during a 6 year period between 1982 and 1987 were compared to determine if the most academically capable students are entering the Agriculture field and to evaluate their success upon graduation. Criteria examined included high school ACT scores, high school percentile ranks (HSP), college accumulated grade point averages (acc GPA), and responses to a survey regarding placement success. Composite ACT scores were higher (P ◄ .05) for students entering Biology (B) and Chemistry (C) than for students entering Agriculture (A) or Agribusiness (AB) comparing 23.22, 24.45, 19.59, and 20.35 respectively. Students entering B and C had higher (P ◄ .05) ACT natural science scores than students entering A or AB. English and Social Science ACT scores were also higher (P ◄ .05) for students entering B and C compared to those entering A or AB. Math ACT scores were higher (P ◄ .05) for students entering C than those entering B, both of which were significantly higher than those for students entering A or AB. Students entering C and B had higher (P ◄ .01) HSP than students entering A. No difference (P ◄ .05) was observed in HSP for students entering A or AB. Regardless of college major, junior college transfer students had lower (P ◄ .01) HSP than non-transfer students. No differences (P ◄ .05) were observed in Acc GPA between majors. When pooled across majors, transfer students had lower (P ◄ .01) Acc GPA than non-transfer students. For those graduates obtaining positions related to their major, C graduates started at significantly higher salaries. Significantly fewer students graduating in B were able to obtain a job related to their major. This study suggests academically superior students are entering B and C rather than A, and recruiting strategies should be more successful if targeted towards students interested in B.

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Purpose and Objectives

The purpose of this study was to determine if the academic ability of agricultural science graduates was significantly different from the academic ability of agribusiness, biological science, and chemistry graduates. The objectives of the study were based on accepted measures in specific areas of instruction common to all study subjects. The objectives were:

1. describe the agriculture, agribusiness, biological science, and chemistry graduates on their ACT

Composite, Mathematic, Natural Science, Social Science, and English scores, on their high school percentile rank, and on their University graduating accumulative grade point average.

2. to evaluate the students success in the job market following graduation via a survey questionnaire.
3. to identify the most likely potential student interest group for successful recruitment.

Procedures

Data were collected from 1384 students graduating during a 6 year period between 1982 and 1987 from Illinois State University majoring in Agriculture, Agribusiness, Biology, and Chemistry. Agriculture (A) graduates totaled 314 representing 22.7% of the population. Agribusiness (AB), Biology (V) and Chemistry (C) graduates totaled 385, 438 and 247 representing 27.8%, 31.6% and 17.9% of the population studied.

The post graduation questionnaire had 13 questions relating to the graduates placement success. A total of 615 persons responded giving a one time response rate of 44.4%. Only one questionnaire was sent out, no follow-up questionnaires were distributed. One hundred forty nine (47.5%) of the Agriculture graduates responded. One hundred eighty-eight (48.8%), 168 (38.4%), and 110 (44.5%) of the Agribusiness, Biology and Chemistry graduates responded, respectively.

Introduction

United States agriculture is an industry which has become increasingly complex and technologically advanced requiring well-trained, highly educated professionals. The technology explosion offers impressive challenges to future graduates. The primary source of these graduates has traditionally been colleges of agriculture (Betts and Newcomb, 1986). However, since 1978 enrollment in colleges of agriculture has declined nearly 25% (Reisch, 1984) yet the U.S. Department of Agriculture's 1986 national assessment of employment opportunities for college graduates predicts more than 48,000 job openings will be available each year, but suggests fewer than 44,000 qualified new college graduates annually with expertise in agriculture, natural resources, veterinary medicine and closely allied fields will be available to meet the demand (Science, 1987). Recent reports indicate that a serious brain drain away from the agricultural sciences is occurring. Academically superior students are seemingly entering other fields of study.

One of the major solutions to rectify this deficit of qualified professionals is recruitment of high ability urban students by colleges of agriculture. Hence, there is a need to determine if the more highly qualified and academically capable students are choosing to enter areas of study other than agriculture and why. Likewise, which non-traditional students can be most successfully recruited in an agriculture major must also be examined.

Data were analyzed with a microcomputer package titled "Statistics With Finesse" (Bolding, 1983). When different treatment means were indicated by a significant F- statistic, least significant difference test was applied.

Results

Students electing to major in A and AB had similar ACT composite scores, but they were lower ($P < .05$) than those of students majoring in B or C (table 1). Accordingly students majoring in A and AB had similar ACT scores in Natural science, English, Math, and Social Science and these scores were significantly lower than those of students majoring in B or C. No significant differences were observed in any of the ACT scores of B or C majors with the exception of Math in which case Chemistry majors scored higher ($P < .05$) than Biology majors comparing 25.68 to 22.74, respectively.

The trend in high school percentile (HSP) rank was similar to the trend in ACT scores. Students majoring in B and C were found to have significantly higher HSP than students majoring in A or AB. HSP and accumulated university graduating grade point averages were also evaluated on the basis of whether the graduate was a transfer student or a non-transfer

Table 1. ACT Scores, High School Percentile Ranks and Accumulated GPA

Major	A	AB	B	C	Mean
Act Score					
Composite	19.59[a]±4.66	20.35[a]±3.83	23.22[b]±3.92	24.4[b]5±3.85	
Natural Science	22.73[a]±5.14	23.27[a]±4.48	26.27[b]±4.57	27.67[b]±4.27	
English	17.84[a]±4.83	18.49[a]±4.09	20.96[b]±4.40	20.69[b]±4.41	
Math	19.28[a]±6.54	19.97[a]±6.09	22.74[b]±5.03	25.68[c]±4.86	
Social Science	18.01[a]±6.46	19.15[a]±5.70	22.43[b]±5.51	23.33[b]±5.76	
High School Percentile Rank[d]					
Transfer	67.33,N= 6	53.00,N= 12	75.29,N= 12	68.50,N= 2	65.62**,N= 34
Native	70.35,N=85	71.37,N=132	77.32,N=168	80.64,N=126	75.44**,N=511
Total Population	70.15[a],=91	69.84[a],N=144	77.16[b],N=182	80.45[b],N=128	74.83,N=545
Accumulated GPA[e]					
Transfer	2.93	2.82	2.91	3.08	2.90**
Native	2.94	2.87	3.00	3.05	2.97**
Total population	2.94	2.86	2.98	3.05	2.95
Percent of Graduates Represented					
Transfer	52.8	51.7	40.0	26.6	45.2
Native	47.2	48.3	60.0	73.4	54.8

[abc] Numbers within a row with different superscripts differ ($P < .05$).
** Numbers under each heading within a column with superscripts differ ($P < .01$).
[d] Numbers represent the percent of students graduating with a lower numerical rank.
[e] GPA's are calculated on a 4 point scale.

student (native). Students receiving their entire undergraduate education at Illinois State University are considered to be native students. In general, native graduates had higher (P ◄ .01) HSP than did transfers (mostly junior colleges) and this trend was true for all four majors, A, AB, B and C. However, only limited data for HSP was available for analysis. Accumulated GPA's were similar for all graduates regardless of major but again transfers had lower Acc GPA than did native graduates comparing 2.90 vs. 2.97 on a 4 point scale. The fact that A and AB students enter college with lower ACT scores and HSP than B and C students but graduate with similar Acc GPA suggests one of three alternatives. One, either ACT scores and HSP are not indicative of a student's college scholastic ability, or two, professors of college Biology and Chemistry curriculuas are more rigorous in their grading systems compared to Agriculture and Agribusiness professors, or three, A and AB professors are more adept teachers and stimulate their students to achieve higher grades.

In the placement survey (table 2) more C graduates than A, AB, or B graduates (in that order) regarded their first job following graduation to be directly related to their major. Only 48.1% of the B graduates thought their first job was related to their major while a majority of C, A and AB graduates were able to find positions directly related to their majors. Of all graduates over half (53.5%) have changed positions at least once since graduation. Chemistry graduates were found to have changed jobs less frequently than other graduates. It is interesting to note that 82 and 83 graduates across all disciplines were found to have changed positions more frequently than graduates of other years, possibly a result of simply being in the job force longer than more recent graduates. Most graduates (61.2%) responded that each career move was related to their major and no significant differences were observed between A, AB, B or C graduates. In general more C and A graduates were found to have current positions directly related to their major, than AB or B graduates. Numerically more C than A, AB or B graduates currently hold positions directly related to their majors.

Starting salaries were higher (P◄ .03) for C than for AB graduates which were higher than either A or B graduates. It should be noted that table 2 shows 82 and 83 graduates received lower starting salaries than 86 and 87 graduates. This is most likely a reflection of the fact that the income ranges were not adjusted for inflation. Perhaps starting salary is one of the

Table 2. Responses to Post Graduation Survey Questions

Response	Mean	A	AB	B	C
Was your first job following graduation directly related to your major?					
Yes	65.3%	73.1%	62.9%	48.1%	84.3%
Somewhat	15.0%	11.7%	13.4%	22.5%	11.1%
No	19.7%	15.2%	23.7%	29.4%	4.6%
Mean Value[1]	1.54 ± .80	1.42 ± .74[a]	1.61 ± .85[b]	1.81 ± .86[c]	1.20 ± .51[d]
Is your present position the same as your first job?					
Yes	46.5%				
No	53.5%				
Mean Value[2]	1.54 ± .50				
How many times have you changed jobs since graduation?[3]					
0	47.8%	47.5%	45.5%	41.5%	62.1%
1	23.1%	21.6%	26.4%	21.8%	21.2%
2	15.2%	17.3%	10.7%	23.2%	8.4%
3	10.3%	10.1%	11.2%	10.6%	8.4%
4	2.7%	2.9%	3.9%	2.8%	0
5	.4%	.7%	.6%	0	0
6	.5%	0	1.7%	0	0
Mean Value	1.00 ± 1.22	1.01 ± 1.20	1.10 ± 1.37	1.11 ± 1.15	.63 ± .94[**]
Is your present position directly related to your major?					
Yes	52.7%	61.3%	52.3%	39.4%	66.0%
Somewhat	22.2%	17.3%	19.6%	29.3%	20.8%
No	25.1%	21.3%	28.0%	31.3%	13.2%
Mean Value[1]	1.72 ± .84	1.60 ± .82[ab]	1.76 ± .87[ac]	1.90 ± .86[c]	1.47 ± .72[b]
Was each career move related to your major?					
Yes	61.2%	66.3%	54.7%	59.3%	72.0%
No	38.8%	33.7%	45.9%	40.7%	28.0%
Mean Value[2]	1.39 ± .51				
In which of the following categories was the starting salary of your first job following graduation?[4]					
$10,000	14.2%	15.5%	10.6%	21.8%	7.6%
$10-14,999	27.2%	32.4%	27.5%	32.7%	11.4%
$15-19,999	36.2%	39.4%	44.4%	25.0%	33.3%
$20-24,999	13.5%	8.5%	12.7%	10.3%	26.7%
$25,000	9.0%	4.2%	4.8%	10.3%	21.0%
Mean Value[3]	2.76 ± 1.13	2.54 ± .99[e]	2.74 ± .98[f]	2.54 ± 1.23[e]	3.42 ± 1.17[g]
How well did your major prepare you for your present employment?					
1	16.4%	11.7%	9.2%	21.3%	28.3%
2	42.1%	53.1%	42.7%	27.5%	48.1%
3	27.3%	24.1%	32.4%	32.5%	15.1%
4	9.2%	7.6%	11.9%	9.4%	6.6%
5	4.9%	3.4%	3.8%	9.4%	1.9%
Mean Value[5]	2.44 ± 1.0	32.38 ± .91[h]	2.58 ± .95[i]	2.58 ± 1.19[i]	2.06 ± .93[j]

[1] 1 = yes, 2 = somewhat, 3 = no
[2] 1 = yes, 2 = no
[3] 1 = $10,000, 2 = $10,000-$14,999, 3 = $15,000-$19,999, 4 = $20,000-$24,000, 5 = $25,000
[4] Score ranged from 1-5, 1 = excellent and 5 = poor.
[*] 1982 and 1983 graduates changed jobs more than other years.
[**] 1982 and 1983 graduates had lower starting salaries than 1986 and 1987 graduates.
(p 01)
[abcd] Means within a row with different superscripts differ (P ► .02).
[efg] Means within a row with different superscripts differ (P ► .03).
[hij] Means within a row with different superscripts differ (P ► .05).

reasons why students with higher ACT scores and HSP are majoring in C rather than in A. In our study, A graduates were found to have starting salaries significantly below the mean of AB and C graduates.

By far, more C graduates thought their major better prepared them for their vocation. Agriculture graduates ranked a high second in their response to this question while AB and B graduates thought their major least prepared them for their present employment. Note the consistent image portrayed by the responses of the graduates to the following three questions.

1. Was your first job following graduation directly related to your major?
2. Is your present position directly related to your major?
3. How well did your major prepare you for your present employment?

Results indicate AB and B graduates rated their job preparation the lowest and fewer AB and B graduates either currently have a position directly related to their major or had a first job directly related to their major compared to A and C graduates.

Summary

In this study B and C graduates were found to have higher HSP and ACT scores than either A or AB graduates suggesting that academically stronger students are entering the B and C fields. Responses to the post graduation questionnaire found more C ► A ► AB ► B graduates hold positions directly related to their major. In addition C graduates also perceived themselves to be better trained for their vocation than did AB or B graduates. Starting salaries were higher for C graduates than for AB graduates and were higher for AB graduates than for either A or B graduates. Even so, A graduates perceived themselves to be better prepared for their vocation than did AB or B graduates. Chemistry graduates were observed to have changed positions less often than other graduates.

This study suggests that if colleges of Agriculture are going to increase their enrollments, the private sector may first have to respond by increasing starting salaries. In addition, as a means of increasing enrollments and enhancing the academic capability of students in Agriculture curricula, recruitment efforts should encourage participation of students with an interest in chemistry and biology. However, because of meager employment opportunities associated with biology following graduation, recruiting strategies should be more successful if targeted towards students interested in biology. In this study academically superior students were considered to be those with higher ACT scores and higher high school percentile ranks. The use of the phrase "academically superior" raises the question, however, as to whether these students are really academically superior or "do they simply have better academic preparation?" This study also raises the questions, "do students majoring in Biology or Chemistry receive better preparation at the high school level?" Are they receiving a more challenging high school curriculum than students majoring in Agriculture? These are necessary questions which should be addressed in future studies.

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Use of the Feedback Approach In Teaching Agricultural Courses With Small Enrollments

Gregory K. Pompelli

Given the continuing decline in enrollment in many agricultural courses and departments around the nation, new interest needs to be placed on using and adapting teaching methods that can most effectively reach students in courses with limited enrollment (Manderscheid). The following paper discusses several observations about the use of one possible method known as the Feedback Approach (Osterman, 1979). As such, this paper concerns the adaptation of the feedback approach for use in a class with less than ten students, as well as the application of the approach.

It is generally accepted the use of a standard lecture approach in classes with small enrollments places a number of serious constraints on the instructor's ability to convey the information to the students (Gage and Berliner, Osterman 1980). First, students are placed in a passive learning situation. For the most part, they are "fed" information by the instructor. Another weakness of the lecture approach is that it lacks a mechanism for students to interact with the instructor or other students. Thus, questions and discussions about complex issues or related material do not become part of the classroom instruction.

If all students were of equal ability and learned at similar rates, these problems might not be as damaging to the teaching process. Unfortunately, even in small classes the learning skill levels of students varies. Furthermore, even when the abilities of students are similar each student is likely to have a preferred learning style. Lectures often effectively negate one of the major advantages of a small class, which is the opportunity to present material on a nearly one-to-one basis.

Involves Learning Styles

The feedback approach, however, is designed to apply techniques that involve each of the four major "learning styles" (Osterman, 1980). These techniques

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