

THE EFFECT OF PARTICIPATING IN A PRE-VETERINARY LEARNING COMMUNITY OF FRESHMEN INTEREST GROUP (FIG) HAS ON THE ODDS OF NEW ANIMAL SCIENCE MAJORS GRADUATE

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Abstract

All first-year students who entered the University of Missouri-Columbia as animal science majors between the fall of 1998 and 2004 ($n = 619$) had the opportunity to participate in a residentially-based Freshmen Interest Group (FIG) and/or a learning community specifically designed for them. The odds of graduating is significant for all three program levels (i.e. FIG, LC, Neither). However, after controlling for entering characteristics (i.e., ACT score, high school GPA, gender, and ethnicity), the students who participated in FIGs have significantly higher odds than those who participated in neither program (Odds ratio 1.698; $p < .0245$). The odds for students who participated in only the learning community but not the FIG were not significantly different from those who participated in neither program (Odds ratio = 1.387; $p > .287$). This study contributes to the growing body of literature regarding the efficacy of an intentionally designed program, such as FIGs, which integrate the curricular and residential experiences of first-year students.

Introduction/Theoretical Framework

A steady barrage of critical reports published over the last 20 years have all made the same basic point; the quality of undergraduate education in this country is unacceptably low. A 1984 report declared that the United States was being underserved by higher education and called for “demonstrable improvements in student knowledge, capacities, skills, and attitudes between entrance and graduation” (Study Group, 1984, p. 15, original emphasis). This theme is repeated in documents such as: *College: The undergraduate experience in America* (Boyer, 1990), *The Student Learning Imperative* (American College Personnel Association [ACPA], 1994), *Returning to Our Roots: The Student Experience* (Kellogg Commission, 1997), *Reinventing Undergraduate Education: A Blueprint for America's Research Universities* (Boyer Commission, 1998), and *Greater Expectations* (Greater Expectations National Panel, 2002). Perhaps the most frequently

cited of these reports is *An American Imperative: Higher Expectations for Higher Education* (Wingspread Group, 1993). Although these documents emphasize different aspects of the undergraduate experience, each clearly states the need for colleges and universities to dramatically improve in terms of access, retention, graduation, and the quality of education leading to a baccalaureate degree. Specifically within Agriculture-related disciplines there is a growing concern over the increasing gap between the numbers of qualified graduates being produced compared to industry demands (Geoker, Coulter, & Stanton, 1995; Russell, 1993). There is no debate about the need to improve; the questions currently debated are how best to improve.

Programs such as Living-Learning Communities and Freshman Interest Groups (FIGs) are widely heralded for effectively and meaningfully improving undergraduate education (Gabelnick, MacGregor, Matthews, & Smith, 1990; Inkelas & Weisman, 2003; Pike, 1999; Pike, Schroeder

& Berry, 1997; Schroeder & Mable, 1994; Shapiro & Levine, 1999). For example, Kelsey and Sexton (2003) have found that first-year students were retained at higher rates when they participated in a learning community designed for Agricultural students. Ball, Garton, and Dyer (2001) looked at two cohorts of first-year students (fall 1997 and 1998, $N = 442$) in the College of Agriculture, Food, and Natural Resources (CAFNR) at the University of Missouri – Columbia to see if participation in a FIG increased retention and GPA earned. The ANCOVA and Chi-Square test of association revealed that CAFNR students who participated in FIGs were not retained in higher numbers, nor did they earn higher GPAs. Recently, Garton, Kitchel and Ball (2005) re-examined the same students to see if there was a difference in total cumulative GPA or graduation rates; they found no differences between CAFNR students who participated in a FIG and those who did not. These results conflict with those of Marrero and Beckett (2005), who looked at two cohorts of first-year students (Fall 2003, $N = 454$; Fall 1998, $N = 457$) from the College of Engineering at the University of Missouri – Columbia to see if participation in a FIG increased retention and graduation. After controlling for high school class rank and ACT scores, the study revealed that Engineering students who started in the fall of 2003 and were in FIGs were more likely to be retained (90% of the FIG students were retained, compared to only 78% of non-FIG students). Further, Engineering students who started in the fall of 1998 and were in a FIG were more likely to graduate (76% of the FIG students vs. 64 % of non-FIG students graduated within 6 years). Consistent with Ball et al., Marrero and Beckett did not find a difference in the GPAs earned. As is the case in most of higher education, colleges of agriculture are seeking to address external and internal demands to improve the quality of undergraduate education. However, the small amount of information generated so far regarding the effectiveness of learning communities specifically designed for the unique needs of agriculture students contains conflicting results.

The benefits of living in residence halls for undergraduate students (especially first-year students) have been well documented for decades (Pascarella & Terenzini 1991, 2005). Multiple studies have found that compared to students who live off-campus or at home, students living in residence halls are more satisfied with- and more involved in- the undergraduate experience, interact more frequently with faculty and staff, perform better academically, and are more likely to graduate (Pascarella, Terenzini & Blimling, 1994, Terenzini, Pascarella, & Blimling, 1999). Furthermore, students who live in living-learning communities are more likely to gain those benefits than those living in traditional residence halls (Pascarella & Terenzini, 1991; Pike 1996, 1999; Pike et al, 1997; Schroeder & Mable, 1994). FIGs and learning communities seek to make the undergraduate experience more “seamless” (Kuh, 1996), and “integrated” (Gabelnick et al., 1990) as opposed to a series of unconnected, and therefore less educationally useful experiences (Cross, 1998).

Current research (Burrigh, 2002; Inkelas & Weisman, 2003; Pascarella et al., 1994; Pike 1996, 1999; Pike et al, 1997; Terenzini et al., 1999) suggests that FIGs and learning communities have varying degrees of success in creating the conditions known to enhance student learning, retention, and graduation. Inkelas and Weisman specify those conditions as: 1) involvement with academic work, 2) involvement with faculty, 3) involvement with student peers, and 4) student engagement. Tinto (1993) succinctly labels the direct outcome of these conditions as academic and social integration. However, learning communities are relatively new programs that vary significantly in design and implementation (Shapiro & Levine, 1999) and the amount of institutional resources (both human and financial) they require to operate (Knight, 2003). It would be useful from both a theoretical and practical perspective to find out the degree to which the Pre-Vet FIGs and learning community foster student success.

Astin’s (1993) Inputs-Environments-Outputs (I-E-O) model posits that student

outcomes (O) are a function of the environments they experience (E) and their entering characteristics (I) (Astin, 1993). This I-E-O model illuminates that to most accurately measure the impact participating in a learning community program has on an outcome such as retention, graduation or being admitted to post-graduate work, one must take into account students' entering characteristics that might influence those outcomes (Inkelas & Weisman, 2003).

There are a number of entering characteristics which influence student persistence (Astin, 1993, 1997; Pascarella & Terinzini, 2005). Astin's (1997) study of over 53,000 students at 360 colleges and universities found that high school GPA was the most salient predictor of all the entering characteristics associated with retention. Astin (1997) reported that high school GPA accounted for 8% of the variance, ACT/SAT added another 2% and gender and ethnicity produced an additional 1% in one-year retention rates; he concluded these are the four most salient entering characteristics.

Rationale for Study

In the fall of 1997 the animal sciences department at the University of Missouri – Columbia collaborated with the department of residential life to establish the Pre-Vet Learning Community for students interested in entering Veterinary Medical School or other related fields. The Pre-Vet Learning Community is composed of students majoring in Pre-Veterinary Medicine and living on the same floor in the residence halls. The student staff members assigned to this floor are usually CAFNR majors (typically from animal sciences) and provide programs tailored to the needs of animal science students. The following year, fall 1998, the animal sciences department offered a Pre-Vet FIG. The students in the FIG are co-enrolled in the same sections of three general education courses. FIG students also take a one-credit seminar co-instructed by a professor and an upper-class student from the animal sciences department. This upper-class student also serves as the student staff member for the floor. Both of these

programs continued to be offered every year.

Previous studies by Ball et al. (2001) and Garton et al. (2005) determined participating in a FIG had no effect for students from the College of Agriculture, Food and Natural Resources (CAFNR). However, a number of reasons suggest additional studies are warranted. First, the two cohorts of students examined in these two studies (fall 1997 and 1998) were from the first two years of the learning community and the first year of the Pre-Vet FIG. These two programs (especially the FIG) may have developed and increased in effectiveness. Second, as Ball et al. indicate, CAFNR students have a different set of interests and needs compared to other students. The Pre-Vet FIG and learning community are specifically structured to meet the needs of animal science majors. The effects of these programs may have been masked given that prior studies combined all CAFNR students as either FIG or non-FIG without taking into account the specific themes of each FIG. Third, undergraduate students can be admitted to Veterinary Medical School prior to completing a Bachelor's degree. Given the relatively small number of CAFNR students who actually do this it is not surprising that Garton et al. did not account for that possibility in their study of graduation rates, but since going to Veterinary Medical School is a priority for many animal science majors this should be taken into account.

Purpose of study

The purpose of this study was to ascertain if animal science majors at the University of Missouri – Columbia who participate in the Pre-Vet FIG and/or learning community are more likely to achieve academic success. The following research question guided this study:

R1: Are animal science majors more likely to graduate or be admitted to Veterinary Medical School based on their participation in the Pre-Vet FIG, Pre-Vet learning community or neither of these programs?

Research Method & Procedures

Population

The population being studied consisted of every undergraduate animal sciences major at the University of Missouri – Columbia who first enrolled in a fall term between 1998 and 2004 ($N = 619$). Data regarding each of these students was collected from institutional records in September, 2005.

Independent Variables

Data regarding high school GPA, ACT score, gender, and ethnicity were collected as measures of entering characteristics. The independent variable of primary interest in this study was a student's participation in the Pre-Vet FIG, Pre-Vet Learning Community, or neither of these programs (coded 2, 1, and 0, respectively). Students who participate in the Pre-Vet FIG also live in the Pre-Vet Learning Community, but there are enough differences between these two experiences that it is appropriate to code them as two different levels of the same variable.

Dependent Variable

During the compilation of the data set the students were in one of the following conditions: graduated, enrolled in Veterinary Medical School, enrolled in undergraduate courses (retained for one or more years), or not enrolled (withdrew/dismissed). Comparing graduation rates is complicated due to the fact that animal science majors are able to be admitted to Veterinary Medical School prior to completion of a Bachelor's degree. Therefore, a "positive outcome" variable was created through combining the variables of "graduated" (yes/no), "still enrolled in undergraduate courses" (yes/no), and "enrolled in Veterinary Medical School" (yes/no). If a student was coded as a "yes" in any of these three variables he or she was coded as a (1) in the new "positive outcome" variable; all other students were coded as a (0) to indicate they had left the institution without either graduating or being admitted to Veterinary Medical School.

Analysis

Logistic regression was selected as an appropriate technique for this study because the outcome variable is dichotomous. Logistic regression allows the use of both categorical and continuous independent variables to measure their relationship to a binary dependent variable, and is one of the most appropriate analytic tools for studying outcomes such as retention and graduation (Dey & Astin, 1993). For this study we used the Statistics Package for Social Sciences version 14. SPSS Logistic Regression computes the odds a person in a given category (in this case participating in the FIG, LC, or neither) will be in either of the outcome conditions (in this case leaving prior to graduation or not) and reports those as the *change in odds* or the odds ratio between the levels of the independent variables.

Limitations

One limitation is that this study has used a dependent variable created from a combination of dependent variables. This was done in an attempt to address the reality that animal science majors can achieve success in a number of ways (i.e., persisting toward graduation, graduating, and being admitted to Veterinary Medical school). Therefore, if one is interested in examining the success rates of students beyond the first year, one must account for this variation.

Another obvious limitation is that participation in the programs studied is voluntary. Therefore, it could be the case that some self-selection effect is occurring; perhaps students who are more committed to academic success in general and attending Veterinary Medical School in particular are also more likely to participate in a FIG. Although proxy variables are included in an attempt to control for entering academic ability, the current study does not allow for measuring any possible effect of self-selection.

Results

R1: Are animal science majors more likely to graduate or be admitted to Veterinary Medical School based on their participation in the Pre-Vet FIG, Pre-Vet learning community or neither of these programs?

As a first step, a basic ANOVA was conducted to see if there were any statistically significant differences in the entering characteristics of students who participated in the Pre-Vet FIG and learning community. As shown in Table 1, students who participated in FIGs earned

higher ACT composite scores (FIG mean ACT = 26.8; LC mean ACT = 25.5; Non-participants mean ACT = 25.8; $p = .004$), but average high school GPA did not differ significantly (FIG = 3.52; Pre-Vet LC = 3.47; Non-participants = 3.42; $p = .149$).

Table 1
Analysis of Variance of Entering Characteristics and Participation

Characteristic	Neither	Pre-Vet LC	Pre-Vet FIG
Entering Academic Ability	<i>M</i>	<i>M</i>	<i>M</i>
HS GPA ($p = .149$) $n = 619$	3.42	3.47	3.52
ACT Comp. Score ($p = .004$) $n = 607$	25.77	25.45	26.76
Demographics	%	%	%
Ethnicity (Pearson's Chi-square = .168)			
Minority (6.6%) $n = 41$	73.2% ($n = 30$)	9.8% ($n = 4$)	17.1% ($n = 7$)
Majority (94.4%) $n = 578$	58.5% ($n = 338$)	12.5% ($n = 72$)	29.1% ($n = 168$)
Gender (Pearson's Chi-square = .005)			
Male (29.1%) $n = 180$	56.1% ($n = 101$)	18.9% ($n = 34$)	25% ($n = 45$)
Female (70.9%) $n = 439$	60.8% ($n = 267$)	9.6% ($n = 42$)	29.6% ($n = 130$)

Based on the demographic information self-reported by students on their application materials, few students (6.6%) in these data were students of color. Although the numbers were small, this 6.6% represented a wide variety of ethnic-racial backgrounds. The researchers conducted an analysis of this variable twice; once as a multi-level variable (i.e., White, African American, Hispanic, Asian American, Native American/Alaskan Native, International, Refuse to Indicate), and once after combining all minority students into one category. This had no impact on the final results. Thus, for ease of reporting the combined variable called "Ethnicity" was included in Table 1 rather than the original multi-level variable.

As is evident from Table 1, female students made up 70% of the incoming

animal science majors between fall 1998 and 2004 and their pattern of participation was different from male students; a greater proportion of male students participated in the Learning Community but not in the FIG (18.9%, and 9.6% respectively, $p = .005$).

As a second step, a cross tabulation was conducted between the program variable and the positive outcome variable. As reported in Table 2, a larger percentage of animal science majors who began their career at MU in the Pre-Vet FIGs (82.3%) achieved a positive outcome compared to those who were only in the Pre-Vet Learning Community (78.9%) or neither of these programs (72.3%). Students in all three program levels were more likely to achieve a positive outcome than not.

Table 2
Cross Tabulation of Program Participation and Having Left School Prior to Graduation and/or Enrolling in Veterinary Medical School

Participation	Left		Enrolled-Grad- Vet School		Odds of Success
	<i>N</i>	%	<i>N</i>	%	
Neither	102	27.7	266	72.3	2.74*
LC	16	21.1	60	78.9	3.80*
FIG & LC	31	17.7	144	82.3	5.13*
Total	149	24.1	470	75.9	

* $p < .001$

Obviously, these results might be easily explained by differences in the entering characteristics of these students. A logistic regression was therefore conducted to ascertain if these differences are significant after taking into account the entering characteristic we already know play an important role in retention and graduation (i.e., high school GPA, ACT composite score, gender, race/ethnicity) (Pascarella & Terenzini, 2005).

Logistic Regression Results

Logistic regression provides the change in odds (odds ratio) of a person being in a given category (in this case achieving or not achieving a positive outcome) when all the other independent variables in the model are held constant. The initial logistic regression demonstrated that gender ($p = .260$) and race/ethnic background ($p = .636$) were not significant. A separate analysis was conducted using race/ethnicity as the original multi-level categorical variable and again as the dichotomous variable of White

and Minority; it remained a non-significant predictor of success in both cases. Since these demographic variables had no influence on the model, the decision was made to drop both gender and ethnicity from further analysis and re-run the logistic regression.

Table 3 provides the results of the final logistic regression. As was expected, both high school GPA and ACT composite score affect student success. When all other variables in this model are held constant, high school GPA is the strongest predictor of whether a student achieves a positive outcome; for every unit increase in high school GPA the odds a student will achieve a positive outcome go up 88.7% (odds ratio = 1.887; $p = .001$). Put another way, a student with a 3.50 high school GPA is 88.7% more likely to achieve a positive outcome compared to students who had a 2.50 high school GPA. ACT composite score, while significant, only increased the odds 8.0% (odds ratio = 1.080; $p = .008$), when everything else is held constant.

Table 3
Results of Logistic Regression

	B	SE ^a	Sig.	Odds Ratio
High School GPA	.635	.194	.001	1.887
ACT comp.	.077	.029	.008	1.080
Neither			.097	
Pre-Vet LC	.358	.310	.287	1.387
Pre-Vet FIG	.486	.242	.024	1.698
Constant	-2.877	.864	.001	.056

^aStandard Error

Participation in a Pre-Vet FIG also increases the odds of achieving a positive outcome. As indicated in Table 3, students participating in the Pre-Vet FIG increase their odds of achieving a positive outcome by 69.8% (Odds ratio = 1.698, $p = .024$) compared to students who were in neither the FIG nor the learning community. The smaller change in odds associated with just living in the Pre-Vet learning community is not significant (odds ratio = 1.387, $p = .287$) compared to students who were in neither program. The results of logistic regression indicate that the increased rate at which FIG students achieve academic success is not simply a function of their entering characteristics.

Discussion

The findings of this research are in line with those of Marrero and Beckett (2005) who have demonstrated the efficacy of the University of Missouri – Columbia's Engineering FIGs on graduation. These results differ slightly from those of Ball et al. (2001) who found that participating in a FIG did not increase retention, and those of Garton et al. (2005) who found no differences in graduation rates among CAFNR students based on FIG participation. The present study used a much broader definition of academic success (i.e., remaining enrolled, graduating or being admitted to veterinary school) and used data from a longer period of time (fall 1998 to

fall 2004), so it would be inappropriate to say these results completely refute those of Ball et al. and Garton et al. However, this study has found that animal science undergraduates who participate in a Pre-Vet FIG are more likely to achieve academic success.

This study presents evidence that animal science students tend to be very successful in general; overall 76% were classified as achieving a positive outcome. However, there are significant differences in the odds an animal science student will remain enrolled, complete a degree and/or be admitted to Veterinary Medical School based on their participation in a Pre-Vet FIG even after controlling for high school GPA and ACT score. The same cannot be said for students who live in the Pre-Vet Learning Community without also participating in the FIG; although a larger percentage of animal science students in the Pre-Vet Learning community achieve academic success compared to students who do not participate, this difference was not significant.

There are many possible explanations for why participating in a FIG improves the odds of student success. A reasonable explanation is that students who participate in the FIG have a very different experience from those who live in the Pre-Vet LC without participating in the FIG. Participating in the FIG entails being co-enrolled in a seminar co-instructed by an animal sciences faculty member and upper-

class animal sciences major, and taking three other classes with the other students in that FIG. Living in the Pre-Vet Learning Community does provide new students with easier access to other animal science majors and a few educational programs specifically tailored to animal science majors, but FIG students enjoy these benefits plus all the benefit of the FIG. This study suggests that simply housing students with a common academic interest on the same residence hall floor is not enough to affect academic success. However, when the curricular experience and the residential experience are intentionally integrated, as the FIG program does, it would appear that student performance can be affected.

One of the problems that plague current research regarding programs such as learning communities and FIGs is the nuanced variety of these programs. Not only do these types of programs vary from institution to institution, there is often some degree of variation within institutions. Specifically in the case of this study, the Pre-Vet FIGs are designed and implemented by faculty and advanced undergraduate students from the animal sciences department. These co-instructors are familiar with the typical issues entering animal science students face and how to best challenge and support them during the process of exploring future careers. The faculty who co-instruct these FIGs know that far fewer than 50% of their students will actually make it into Veterinary Medical School. By helping first-year students gain a more accurate understanding of what is required to be admitted to Veterinary Medical School and what being a veterinarian entails, they are able to challenge these students to thoroughly examine their dream of going to Veterinary Medical School. More importantly, these faculty and advanced undergraduate students form a relationship with these first-year students which allows them to provide support in the form of validating students' long-term decisions and helping them explore meaningful and appropriate alternative long-term plans or preparing to apply to Veterinary Medical school. It may well be the case that part of the reason animal science majors who participate in the

FIG are less likely to leave school prior to graduation is because the FIG experience helps them develop a clearer, more realistic view of what they are going to accomplish during their undergraduate program.

The pattern regarding the importance of entering characteristics is consistent with that found by Astin (1997); again high school GPA has been found to be a more powerful predictor of success compared to a statistically significant, but less powerful effect of ACT score. However, the present study did not reveal a significant difference based on gender or race/ethnicity; something the researchers interpret as positive news. Given the relatively small number of students of color in this sample, this finding should be interpreted with extreme caution.

This study offers an important contribution to the literature. These results support reviewing past research findings once a program is more fully established; findings from the first year or two of a program could be unduly high (perhaps a Hawthorn effect) or low (perhaps programs improve over time). Most importantly, this study lends support to the growing body of literature that suggests FIG programs provide a useful vehicle for faculty to enhance the learning experience of students.

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