

Agricultural Youth Organizations and University
Learning Communities: The Impact On Agriculture Students'
Academic Performance and Degree Completion

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Abstract

One of the most important challenges facing colleges of agriculture today involves recruiting and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. This study compared the impact of participation in agricultural youth organizations (4-H/FFA) and participation in a university learning community, Freshman Interest Group (FIG), on academic performance and degree completion of students in a college of agriculture at a midwestern land-grant university. Students enrolled in a college-wide learning and development course in the Fall of 1997 ($n = 245$) participated. Analysis of Covariance (ANCOVA) procedures were utilized to determine the impact of participation in agricultural youth organizations and FIGs on academic performance. The Chi square test for association was utilized to determine the influence of participation in agricultural youth organizations and FIGs on degree completion.

Prior involvement in agricultural youth organizations was found to have a significant association with students' academic performance as well as degree completion. However, participation in a FIG was not found to be a significant variable in its influence on either academic performance or the completion of a baccalaureate degree. The study raises important implications for the recruitment of individuals with prior experience in agricultural youth organizations as potentially successful students in colleges of agriculture.

Introduction/Theoretical Framework

"Nothing is permanent but change." This quote by the Greek philosopher, Heraclitus, presents a holistic summary of agriculture over the past century. It also provides an accurate projection of what agriculture is likely to experience in the new millennium.

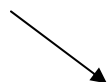
Change has been a defining characteristic of agriculture. In 1950, 17% of the population in the United States lived on a farm, whereas today, less than two percent of the population resides on a farm. Yet, agricultural production has increased by 150% over the past 45 years (National Research Council [NRC], 1995). Furthermore, farming is not the only segment of agriculture that has experienced change. The food, fiber, and natural resource sectors currently employ 18% of the U.S. population and contribute 16% of total "value added" endeavors in the processing, marketing, and distribution of agricultural products (NRC, 1995). Through research, development, and education, colleges of agriculture across the nation have contributed greatly to this growth in productivity (NRC, 1996). However, with change comes challenge; and colleges of agriculture must face the challenges of providing education for the human resource base in a rapidly growing, increasingly global, and highly technological food, fiber, and natural resource system (NRC, 1996).

Possibly, the most important challenges facing colleges of agriculture today involve recruiting, retaining, and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. Goeker, Coulter, and Stanton (1995) predicted that at the turn of the millennium a shortfall of almost four percent would exist between employment opportunities and available graduates in food and agricultural sciences and cooperating fields. The previous prediction supported Russell's assertions of an impending "brain drain" in agriculture, or more specifically, a lack of qualified individuals with an agricultural background or experience (Russell, 1993). In addition to changing industry demands, colleges face great monetary investments dependent upon the academic success and degree completion of their students. With rising costs of education and depleting sources of funding, loss of students in colleges of agriculture translates to significant losses of instructional dollars (Dyer, Lacey, & Osborne, 1996). To remain viable, colleges of agriculture must meet these challenges by discovering ways of predicting the academic success and ensure the academic degree completion of its students.

In studying the complex phenomenon of education, Cruikshank (1990) suggested using theoretical models such as those developed and tested by Dunkin and Biddle. The theoretical framework for this study was derived from an adaptation of Mitzel's Model of teaching, as presented by Dunkin and Biddle (1974). In their model, Dunkin and Biddle suggested that the study of teaching and learning involve four categories of variables: presage, context, process, and product (Figure 1).

Presage Variables (Teacher)

Personality traits
Teaching skills
Teaching styles



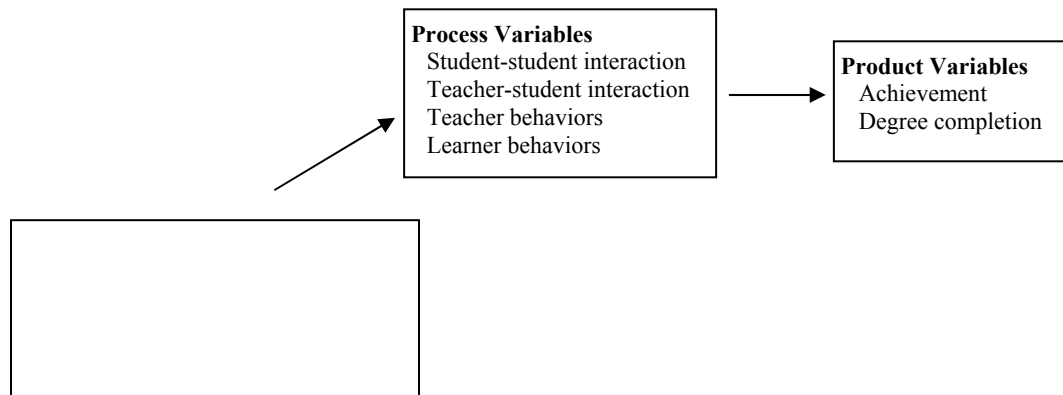


Figure 1. Theoretical Model for the Study of Classroom Teaching

Presage variables include those that influence teachers and their teaching behaviors (i.e., those things that teachers contribute to the learning process). Context variables are those that students contribute. Context variables include the background of learners, their prior knowledge and skills, their attitudes toward learning, and their involvement in organizations and activities that may potentially shape the nature of their personality and skill development, such as 4-H and/or FFA. Process variables describe the interaction of teacher and learner behaviors in the teaching-learning process. Examples include institutional activities and programs that support teacher-student or student-student interactions, such as learning communities. Finally, product variables include the knowledge and skills gained or attitudes modified as a result of teaching and learning.

Involvement in agricultural youth organizations such as FFA and 4-H are important context variables that have been shown to influence educational outcomes such as student achievement, skill attainment, and even student retention in colleges (Dyer & Breja, 1999; Dyer, et al, 1996). At an ever-increasing rate, students who enter colleges of agriculture are deficient in agricultural experience (Dyer, et al, 1996; Scofield, 1995). Dyer, Lacey, and Osborne noted that colleges of agriculture could select students with the next best thing: experience in high school agriculture classes, 4-H, and FFA. Participation in 4-H and FFA was shown to influence the outcomes of achievement and life skill development (Fleming-McCormick & Tushnet, 1997; Junge, 1994; Pruckno & Miller, 1987; Seevers & Dormody, 1994; Thomas & Ladewig, 1985). Another important influence on the products of teaching and learning is the educational setting or the academic institution in the teaching and learning process. Not all learning takes place in the classroom. Institutions of higher education nationwide have developed the concept of learning communities in response to the current needs for enhanced academic performance, as well as improved rates of student retention (Hill, 1990; University of Missouri, 1996). Lenning and Ebbers (1999) defined learning communities as small subgroups of learners organized by common purpose and mode of interaction.

Learning communities are organized in a variety of approaches, such as freshmen interest groups, learning clusters, federated learning communities, and coordinated studies communities (Lenning & Ebbers, 1999; Tinto & Goodsell, 1994). Organized as clusters of students with common characteristics, similar academic interests, enrolled in similar courses, and living

together in a residence hall, Freshman Interest Groups (FIGs) in particular have been noted to increase students' levels of academic performance and retention in postsecondary institutions (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996). Pike, Schreoder, and Barry (1997) concluded that student involvement in residential learning communities improved educational outcomes by fostering increased levels of student-student and faculty-student interactions, as well as enhanced student involvement in coursework. While a strong literature base supports FIGs as enhancing the outcomes of teaching and learning, research involving FIG participation among college of agriculture students is lacking. Specifically, can involvement in FIGs be utilized as a process variable to predict the product variables of student achievement and student degree completion in colleges of agriculture?

The current literature base is helpful in identifying context variables that can serve as predictors of student retention or life skill attainment. However, little research exists regarding the effectiveness of those context and process variables, specific to agriculture students, in predicting students' academic performance, specifically at the college level. Can selected context variables (4-H or FFA involvement) be a distinguishing characteristic on the academic performance and degree completion of students in colleges of agriculture?

By targeting specific variables that have the potential to enhance academic performance and degree completion, colleges of agriculture have an opportunity to shape the changing face of agriculture, just as they have shaped scientific advancements and management practices in the past. While the population in the U.S. is on the rise, the population of individuals possessing experience with or a background in agricultural endeavors is in rapid decline (NRC, 1995). Colleges of agriculture across the nation must find ways to respond to the challenges of a population and a workforce in the midst of an agricultural "brain drain." Consequently, a research base is needed to identify characteristics that can be used in predicting the academic performance and degree completion of students in colleges of agriculture.

Purpose and Objectives

The purpose of this study was to compare the impact of involvement in agricultural youth organizations (4-H/FFA) and participation in Freshmen Interest Groups (FIGs) on academic performance and degree completion of students in a college of agriculture at a midwestern land-grant university. The following research questions were used to guide the study:

1. Did students who participated in agriculture youth organizations (FFA and/or 4-H) have greater academic success than students who did not participate in agricultural youth organizations?
2. Did students who participated in a Freshmen Interest Group (FIG) have greater academic success than those students who did not participate in a FIG?
3. Did students who participated in agriculture youth organizations (FFA and/or 4-H) have a greater chance of completing a baccalaureate degree than students who did not participate in agriculture youth organizations?

4. Did students who participated in a Freshmen Interest Group (FIG) have a greater of completing a baccalaureate degree than students who did not participate in a FIG?

For the purpose of statistical analysis, the research questions were posed as null hypotheses.

- HO₁: There was no difference in the academic performance of students who had prior involvement and those who did not have prior involvement in agricultural youth organizations, when controlling for the variance associated with ACT score.
- HO₂: There was no difference in the academic performance of students who participated in a FIG and those who did not participate in a FIG, when controlling for the variance associated with ACT score.
- HO₃: There was no difference in the degree completion rates of students who had prior involvement and those who did not have prior involvement in agricultural youth organizations.
- HO₄: There was no difference in the degree completion rates of students who participated in a FIG and those who did not participate in a FIG.

Methods/Procedures

The target population for this ex post facto study was freshman entering a college of agriculture at a midwestern land-grant university in the Fall of 1997 ($N = 326$). The accessible sample consisted of intact groups of freshmen enrolled in a college learning and development course ($n = 245$).

Participation in agricultural youth organizations was determined by students' prior enrollment in either FFA and/or 4-H at the high school level. Involvement in a Freshman Interest Group (FIG) consisted of approximately 20 students living in the same residence hall. Participation requirements included concurrent enrollment in at least three courses and a weekly Proseminar led by a junior or senior student serving as a Peer Advisor.

Students' academic performance was measured by their cumulative grade point at the completion of the academic degree program. Degree completion was determined based upon students' attainment of a baccalaureate degree at the conclusion of four and one-half academic years. Descriptive statistics were generated for composite ACT score as well as cumulative GPA at the completion of the academic degree program. Values for cumulative GPA, composite ACT, and degree completion status were collected from a university database. Research hypotheses one and two were analyzed using analysis of covariance (ANCOVA). An ANCOVA procedure was used because there were between group differences of ACT scores. Research hypotheses three and four were tested using the Chi Square test for association. An alpha level of .05 was established a priori for all statistical tests.

Results/Findings

The mean cumulative GPA of students who had been involved in an agricultural youth organization was 3.1, whereas the mean cumulative GPA of students who had not been involved in an agriculture youth organization was 2.7 (Table 1). The mean composite ACT score for students who participated in agricultural youth organizations was 25.4, whereas the mean composite ACT score for students who did not participate in an agriculture youth organization was 24.4.

Table 1. *Descriptive Data for Academic Performance and ACT Score by Involvement in Agricultural Youth Organizations*

	Involved (n=96)			Not involved (n=149)		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Cumulative GPA	3.1	.6	0-4.0	2.7	.7	0-4.0
ACT score (covariate)	25.4	3.9	15.0-34.0	24.4	4.0	15.0-33.0

The first null hypothesis was developed to ascertain if there was a difference in the academic success of students who had or did not have prior involvement in agricultural youth organizations. The main effect, involvement in agricultural youth organizations (FFA and/or 4-H), produced a significant difference in students' academic performance when controlling for the variance associated with ACT score (Table 2). Therefore, the null hypothesis asserting that there was no difference between the performance of students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 2. *Analysis of Covariance of Involvement in Agricultural Youth Organizations by ACT Score*

Source	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Intercept	1	7.91	20.35	.00
Covariate (ACT score)	1	19.81	50.94	.00
Main effect (Ag Youth participation)	1	5.50	14.13	.00
Error	236	.39		

The mean cumulative GPA for students who participated in a FIG was 3.0, whereas the mean cumulative GPA for students who did not participate in a FIG was 2.8 (Table 3). Furthermore, the mean composite ACT score for students who participated in a FIG was 26.5, whereas the mean ACT score for students who did not participate in a FIG was 23.9.

Table 3. *Descriptive Data for Academic Performance and ACT Score for Freshmen Interest Group (FIG) Participation*

	<u>Participated (n=81)</u>			<u>Did Not Participate (n=164)</u>		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Cumulative GPA	3.0	.7	.6-4.0	2.8	.7	0-4.0
ACT score (covariate)	26.5	3.4	18-33	23.9	4.1	15-34

The second null hypothesis sought to ascertain if there was a difference in the academic success of students who participated or did not participate in a Freshmen Interest Group (FIG). The main effect, participation in a FIG, did not produce a significant difference in students' academic performance when controlling for the influence on academic performance associated with ACT score (Table 4). Therefore, the null hypothesis asserting that there were no differences in academic performance between students who participated in a FIG and students who did not participate in a FIG was not rejected.

Table 4. Analysis of Covariance of FIG Participation by ACT Score

Source	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Intercept	1	5.41	13.12	.00
Covariate (ACT score)	1	20.78	50.42	.00
Main effect (FIG participation)	1	2.79	.000	.99
Error	236	.41		

The purpose of the third null hypothesis was to determine if a difference existed in the degree completion of students who did or did not have prior involvement in agricultural youth organizations. Of the 149 students who did not have prior involvement in an agricultural youth organization, 71 did not complete a baccalaureate degree in the four and one-half year time span (Table 5). Of the 96 freshmen that had been involved in an agricultural youth organization, 17 did not complete a baccalaureate degree. Pearson's Chi Square yielded a value of 22.7, which was significant ($p = .001$). Thus, the null hypothesis asserting that there were no differences in degree completion between students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 5. Contingency Table by Degree Completion and Agricultural Youth Organization Participation

	Completed a Degree		Total
	No	Yes	
Not Involved in Ag Youth Organizations	71 (47.7%)	78 (52.3%)	149
Involved in Ag Youth Organizations	17 (17.7%)	79 (82.3%)	96
Total	88 (35.9%)	157 (64.1%)	245

$$\chi^2 (1, N=245) = 22.74, p < .05$$

The final null hypothesis sought to determine if a difference existed in the degree completion of students who participated in a FIG versus those who did not participate. Of the 164 freshmen not participating in a FIG, 63 did not complete a baccalaureate degree. Regarding the 81 freshmen participating in a FIG, 25 did not complete a baccalaureate degree. Pearson's Chi Square yielded a value of 1.34, which was not significant ($p = .25$). Therefore, the null hypothesis asserting that there were no differences in degree completion between students who participated in a FIG and students who did not participate in a FIG was not rejected.

Table 6. *Contingency Table by Degree Completion and FIG Participation*

	Completed a Degree		Total
	No	Yes	
Did Not Participate in a FIG	63 (38.4%)	101 (61.6%)	164
Participated in a FIG	25 (30.9%)	56 (69.1%)	81
Total	88 (35.9%)	157 (64.1%)	245

$$\chi^2 (1, N=245) = 1.34, p > .05$$

Conclusions and/or Recommendations

Students who were involved in agricultural youth organizations possessed important differences in performance measures associated with cumulative GPA. This finding is consistent with Dyer et al. (1996). The practical implications of this difference form striking distinctions between those who are selected and those who are excluded from college admission and/or scholarships based upon cumulative GPA. In addition, students who were involved in agricultural youth organizations scored approximately two points higher on the ACT. Yet, when utilizing ACT score as a covariate to equate the groups on performance measures, involvement in agricultural youth organizations was still found to have a significant influence on cumulative GPA.

Additionally, involvement in agricultural youth organizations was found to have a significant association with the attainment of a baccalaureate degree. This finding was consistent with previous research indicating the influence of involvement in FFA and 4-H as an important indicator for retention in a college of agriculture (Dyer et al., 1996; Dyer & Breja, 1999). Thus, prior experiences, such as involvement in agricultural youth organizations, can serve as significant context variables in their influence on the product variable of academic performance and retention in a college of agriculture. The implications of this finding are twofold. First colleges of agriculture, in order to ensure the success of their students, should continue efforts to recruit individuals with prior experiences in agricultural youth organizations. Finally, colleges of agriculture should continue to educate individuals in the fields of agricultural and extension education in order to maintain a quality pool of FFA chapters and 4-H clubs from where future college of agriculture students may be selected.

Students who participated in Freshmen Interest Groups (FIGs), while not markedly different in performance measures associated with cumulative GPA, did possess slightly higher ACT scores than those who did not participate in a FIG. When utilizing ACT scores as a covariate to equate the groups on performance measures, participation in a FIG was not found to be a significant process variable in its influence on academic performance. Additionally, participation in a FIG was not found to possess a significant association with the completion of a baccalaureate degree. This finding contradicts prior studies (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996) indicating the positive influences of FIG participation on a student's academic performance and retention at the postsecondary level. While research has pointed toward FIGs as an effective solution for

increasing students' degree completion and academic performance across universities as a whole, college of agriculture students may not experience the effects of FIG participation as immediately as do students in other colleges. Further quantitative as well as qualitative research is needed to determine the direct effects of FIG participation specific to college of agriculture students. In addition, continued quantitative and qualitative studies are warranted to further indicate presage, context, and process variables that can enhance the products of student achievement and degree completion in colleges of agriculture.

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First, allow me to applaud you on an innovative approach in this study. It is refreshing to see the use of unique theoretical modeling and components from other disciplines to inform our field. I particularly liked the notion of exploring the use of learning communities and context variables for their potential impact on student achievement and degree completion.

The purpose was to compare involvement in agricultural youth organizations and participation in Freshmen Interest Groups (FIG) on academic performance and degree completion. It appears that "academic success" was determined by cumulative grade point at the completion of the program and degree completion by attainment of the baccalaureate in four and one-half years.

This study used an ex post facto method with 245 intact freshman enrolled in a college course in 1997. I assume that participation in FFA and/or 4-H in high school was gathered through the survey instrument. Only 20 students of the 245 were involved in the FIG. ANCOVA was used to control for variance with ACT scores because there was a difference between groups. Is this the most appropriate method of analysis? Isn't this really a univariate model with academic performance as the only dependent variable? Doesn't the literature state that SAT and ACT are only predictors of success for the first semester of college? Why would you control for variance associated with ACT score in graduating college students?

The researchers found that students who were involved in agricultural youth organizations had a higher GPA. Could that be due to acquired organizational and time management skills learned through association with these organizations? No significant difference existed between students who participated in a FIG and those who did not in regards to academic performance. Previously in methods, the FIG number of participants was 20, but in Table 3, $n=81$. I was confused by the discrepancy and hope the authors will elaborate on this point in the presentation.

I thought the data regarding prior involvement in youth organizations and degree completion was very interesting. Wow! Something is going on here! I would recommend further research in this area.

The implication that universities would use prior participation in FFA and 4-H to select students is a bit disturbing, especially if we are trying to recruit more students in our programs to meet the shortfall between employment opportunities and available graduates. As was stated in your introduction, fewer students live on farms and have prior exposure to agriculture prior to coming to college. Other studies have mentioned negative perceptions of agricultural education and FFA as barriers to recruitment into secondary programs, especially with minority groups (Myers, Dyer, & Breja, 2002). Furthermore, who's to say that GPA is the only indicator of academic success? How well do these students perform in the workplace, etc.? I also think it would be interesting to look at affective variables when considering the use of FIG as a variable impacting students. Although you found no significant differences in achievement and graduation, participating in learning communities could have other impacts.