Variables Affecting Final Grade Outcome in Undergraduate Animal Science Courses

Matt McMillan, Alisha Bullion, Kyle Stutts, Stanley Kelley, Marcy Beverly, and Lesley Rakowitz
Sam Houston State University
Huntsville, TX 77341

Abstract

This study evaluated 928 students over a period of two 16-week semesters. Attendance, gender, classification, and major were recorded for all students in undergraduate animal science courses taught at Sam Houston State University (SHSU). The results indicated that classroom attendance had an impact on student's final course grade, although no differences were found between gender and number of absences. However, females had a higher final course grade. Sophomores attained the highest rate of absenteeism but course grade did not differ from their undergraduate peers. Animal Science majors had fewer absences than non-majors, but no differences existed for final grade. A prediction equation using gender, classification, and number of days absent was developed to determine future final grade outcomes. A negative correlation existed between final course grade and number of days absent, major, classification, and gender. A positive correlation existed between numbers of days absent when compared to major and gender. Lastly, a negative correlation existed between classification and number of days absent. Therefore, results of this data prove that increased absences result in a lower final grade. Further, females obtained higher final grades than males, but major and classification had no effect on final grade outcome.

Introduction

The impact of college attendance on the individual is generally believed to go beyond his or her acquisition of academic knowledge and attainment of competence in technical areas (Funk and Willits, 1987). An obvious benefit to attending class is the ability to gain knowledge as outlined by the course objectives and enhance the learning outcome in each course. There is also the ability to gain competence and improve the performance on homework and tests with the potential outcome of improved grades. If a student does not achieve these goals, it can negatively compromise the student's grade point average (GPA). Nevertheless, many students realize the importance of classroom attendance and participation, but their realization is often too late into the semester or into their academic career to overcome the deficit incurred in their grades, and this becomes a reflection in their aptitude and abilities (Eash et al., 2006).

Gender is a topic that in years past, researchers have determined significant differences between male and female student achievement in science courses (Johnson et al., 1998). Generally, research has revealed that females perform better than males throughout their scholastic careers in subjects which require verbal competence (Burke, 1989). However, McCornack and McLeod (1988) questioned whether there was a relationship between success in college and the predictors of scholastic aptitude and high school grades between males and females. They determined that in lower level (freshman and sophomore) courses, if success was to be measured by GPA, there were no differences in gender. Yet, when using a single equation to try and predict the cumulative GPA of lower division students at the university small differences were determined between sexes.

Data reported by Mousel et al., (2006) determined the impact of academic major and agricultural experience in an undergraduate introductory forage crop management course. Students with a higher classification and field exposure performed better in lectures and laboratories than those with no agricultural background. On the contrary, according to Greene and Byler (2004), limited overall effect on grades was reported based on farm background or experiences between students in an introductory animal science, plant science, and agricultural business course. Also, Wildman and Torres (2002) and Donnermeyer and Kreps (1994) found that the most influential factor related to students' choice of major in agriculture was prior agricultural experience.

Previous research indicates that attendance, gender, classification, and major have all affected final grade outcome. Analysis of variance, regression, and correlation analysis were used in the statistical analysis and a prediction equation was established to determine future student grade outcomes from this output.

Materials and Methods

During the 16-week semesters in the fall of 2006 and spring of 2007, numbers of absences were recorded in all undergraduate animal science courses taught at Sam Houston State University to evaluate the relationship between absenteeism and the overall success of students as indicated by the student's final course grade. Courses in the study included: AGR 169 (Introductory to Animal Science; n=164), AGR 230 (Livestock Evaluation and Selection; n=22), AGR 236W (Animals and Society; n=126), AGR 269

(Confinement Animal Production; n=25), AGR 363 (Anatomy and Physiology of the Domestic Animals; n=47), AGR 364 (Horse Science; n=25), AGR 373 (Animal Nutrition; n=92), AGR 376 (Meat Science; n=44), AGR 431 (Animal Growth and Performance; n=23), AGR 460W (Livestock Management Techniques; n=18), AGR 470 (Forage Crops and Pasture Management; n=47), AGR 476 (Sheep and Goat Production and Management; n=19), AGR 480W (Beef Cattle Production and Management; n=20), AGR 483 (Range Management; n=27) AGR 489W (Animal Reproduction; n=55), AGR 491 (Advanced Horse Production and Management; n=13), AGR 494W (Animal Feeds and Feeding; n=39), AGR 495 (Animal Breeding and Genetics; n=49), AGR 496V (Marketing of Livestock; n=18), AGR 496.01 (Selection and Evaluation of Horses; n=11), AGR 496.02 (Companion Animals; n=15), and AGR 496.03 (Livestock Behavior; n=16). These courses were taught by six faculty members in the Department of Agricultural and Industrial Sciences.

Final course grades were based on examinations, projects, homework, and/or quizzes; however, the weighting of each criterion varied by course and faculty member. Grades were calculated and distributed based on the following scale: A = 100 to 90%, B = 89 to 80%, C = 79 to 70%, D = 69 to 60%, and F = 59% and below.

Research was conducted to determine how these variables affected final grade outcome in undergraduate animal science courses. Variables recorded included number of absences, gender, classification, and major (animal science vs. non-animal science). MINITAB 15® (2006) was used for all statistical analyses, including Pearson correlation values that were generated between grade, gender, and the number of absences. Each variable was assigned a continuous variable so that regression could be performed. Codes were as follows: Females = 0, Males = 1; Freshmen = 1, Sophomores = 2, Juniors = 3, Seniors = 4, Non-major = 0, Majors =1. Analysis of variance for numerical course grade and number of absences were evaluated.

Results and Discussion

The models utilized for both dependent variables (grade and absence) were three separate one-way ANOVA's using the independent variables gender, classification, and field of study. Additionally, a stepwise regression model using the listed factors as predictors for course grade was generated, the proposed model was $Y = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4$ where: Y = course grade; $\beta0$ = constant; X1 = number of absences; X2 = gender; X3 = classification; X4 = major. Table 1 provides the number of observations for classes observed including gender, classification, and major for each of the evaluated years. The majority of the participants were female (51.7%) with the most or 31.2% of the students classified as juniors and 29% classified as seniors. Animal Science majors accounted for 56.6% of the sample, which included Pre-veterinary Medicine and Wildlife Ecology majors. Non-majors accounted for 43.4% of the data set. These majors included Agriculture, Agricultural Business, Agricultural Mechanization, Horticulture and Crop Sciences, and/or other non-agriculture related majors.

Table 1. Number of observations for classes observed, gender, classification, and major

	Total		Fall 2006		Spring 2007	
	n	%	n	%	n	%
Classes Observed	30	100	14	46.7	16	53.3
100 Level	4	13.3	2	50.0	2	50.0
200 Level	4	13.3	2	50.0	2	50.0
300 Level	6	20	4	66.7	2	33.3
400 Level	16	53.4	6	37.5	10	62.5
Gender	915					
Female	473	51.7	246	51.3	234	48.7
Male	442	48.3	219	48.9	229	51.1
Classification	915					
Freshman	135	14.5	78	57.8	57	42.2
Sophomore	224	24.1	119	53.1	105	46.9
Junior	290	31.2	140	48.3	150	51.7
Senior	266	28.7	124	46.6	142	53.4
Field of Study	915					
Animal Science	518	56.6	253	48.2	272	51.8
Non-major	397	43.4	210	52.1	193	47.9
Total Observations	915					

Over the evaluation period, there were no differences (P>.05) in the average number of absences between the female and male students as outlined in Table 2. These findings are comparable with the results published by Maccoby and Jacklin (1974) and McCornack and McLeod (1988) that no direct relationship was determined for gender and number of absences. With respect to classification, sophomore (9.5) students had the highest average number of absences (P<.01) than junior (8.2) students (Table 2), while freshman and senior students were similar to both. However, a trend was observed amongst freshman and sophomore students identifying more absences than when compared to junior and senior students. Thus, contradicting the study conducted by Bridges and Casavant (2002) which reported a higher participation rate among freshmen and sophomores rather than juniors and seniors. However, since junior and senior absences are not different (P>.01) and a trend is observed indicating less absences for upper classmen, it may be possible that students enter their junior year and become more engaged in their major area of study. Since the courses are more specialized, there is more of an interest within the student to participate in the classroom environment. Furthermore, Animal Science majors had less (P<.01) absences than non-majors (Table 2). This variation could be attributed to the student's interest level in the course material. Given that the courses being evaluated were Animal Science oriented and were required courses for all degree seeking Animal Science students. Course grades were recorded for each student registered for each course evaluated.

When considering final course grade outcome, female students had higher (P<.05) final grades when compared to male students (Table 3). This coincides with Aitken (1982), who clarified in his regression model that women had an increase in grade possibly due to being more highly motivated or willing to develop better academic skills when necessary. There were no differences (P>.05) found in final course grade among student classifications. This contradicts the results of Mousel et al., (2006) which suggested that final grades increased as class rank increases. In this present study, there were also no differences found in final course grade when compared to major. This also contradicts Greene and Byler (2004) who concluded a letter grade difference between those students that had experience in a particular course of study over those that did not. Mousel et al., (2006) also suggested that experience in the academic major does impact the success of a student in a related course or course in their field of study.

Table 2. Number of absences by gender, classification, and major field of study

Variable	n	# of absences
Gender		
Female	480	8.5 ± 4.8
Male	448	8.8 ± 4.7
Classification		
Freshman	135	9.3 ± 4.9[a,b]
Sophomore	224	9.5 ± 5.2[a]
Junior	290	8.2 ± 4.5[b]
Senior	266	8.3 ± 4.6[a,b]
Major		
Animal Science	525	8.3 ± 4.6[a]
Non-major	403	9.1 ± 4.9[b]

[a,b] Within a column, number of absences without a common superscript letter differ (P<.01)

Table 3. Course Grade by Gender, Cl assification, and Major Field of Study

Variable	n	Grade
Gender		
Female	480	81.37 ± 13.04[a]
Male	448	79.02 ± 13.04[b]
Classification		
Freshman	135	82.35 ± 15.71
Sophomore	224	79.44 ± 13.00
Junior	290	79.86 ± 12.54
Senior	266	79.84 ± 12.30
Major		
Animal Science	525	80.37 ± 13.42
Non-major	403	80.06 ± 12.65

[a,b] Within a column, final course grade without a common superscript letter differ (P<.05)

Table 4 provides the coefficients for the best fit regression model for predicting course grade. Number of absences, gender, and classification were included as predictors, due to their contribution to R^2. Major was removed from the model because it had no affect on R^2. The prediction equation indicated that an increased number of absences negatively affected student performance as determined by final course grade. Therefore, for every absence in class, a student's final course grade is expected to decrease in value by 1.25 points from a constant of 92.1 when absence is the only predictor used in the model. When

gender was added to the model, the intercept remained the same, but the R^2 value increased. Furthermore, when classification was added to the model, the intercept increased as well as the R^2 value. Therefore, more can be explained when all three predictors are included in the model. These results suggest that attendance is important to student success in university lecture-based courses as stated by Eash et al., 2006. Marburger (2001) also supported these results finding significant relationships between absenteeism and student learning. Furthermore, when gender is added as a predictor and the student is a male, the final grade is decreased by 2.05 points, which supports results published by Burke (1989) who conducted a series of analyses related to gender and grades. Nonetheless, this data opposes results established by Durden and Ellis (1995) and Boli et al., (1985) who stated that there were no gender-related differences in student performance from their data collected and evaluated.

Table 5 establishes correlative values for the number of absences, major, classification, and gender. A negative correlation was determined when comparing final grade to number of absences, major, classification, and gender. Results would indicate that students with more absences had lower grades; non-majors had lower grades, as classification increased, grades decreased, and males tended to have lower grades than females. Furthermore, a positive correlation was determined between number of absences when compared to major and gender. Therefore, non-majors and males tended to have more absences. Lastly, a negative correlation was determined between number of absences and classification finding that as classification progressed from freshman to senior, number of absences accrued by student decreased. These results validate the hypothesis that the number of absences will decrease a student's final course grade indicated by a strong negative correlation ($r = -0.46$). However, while major, classification, and gender display a negative relationship when compared to final grade, they have minimal effects on grade with correlation values near 0. Furthermore, when comparing number of absences to classification, a negative correlation was determined, but here again it was very weak. The same is true for the positive correlation between number of absences when compared to major and gender. These relationships were small and explained little variation among students.

Table 4. Regression Model Values for Grade Prediction Equation

Model	Intercept	Absence	Gender	Classification	R^2	*p*
1	92.1	-1.25	-	-	.213	.0001
2	92.1	-1.25	-2.05	-	.219	.009
3	94.55	-1.27	-1.99	-0.83	.223	.02

Table 5. Pearson Correlation Coefficients for Absence, Major, Classification, and Gender

Variable	Final Grade	Absence
Absence	-0.461	
Major	-0.012	0.084
Classification	-0.022	-0.102
Gender	-0.090	0.026

Summary

There was no statistical difference between genders for number of absences accrued during a semester, although males had a numerically higher number of absences than females. Sophomores had the highest number of absences within a semester followed by freshman, seniors, and juniors, respectively. The difference in number of absences between juniors and sophomores was significant. In general, upperclassmen had fewer absences than underclassmen. In addition, animal science majors had significantly fewer absences in these undergraduate animal science courses than non-majors.

Females had significantly higher final course grades than males. There were no differences in final course grade among classifications. Numerically, freshman obtained the highest final grades followed by juniors, seniors, and sophomores, respectively. There was also no difference in final course grade between animal science majors and non-majors; however, animal science majors had numerically higher grades.

In the regression analysis, it was determined that number of days absent, gender, and classification all contributed information to the prediction equation. However, the R^2 value for the prediction equation tended to be fairly low. While this model can still provide some information as a prediction equation to determine final grade outcome for future students, a higher R^2 value would be desired.

Finally, correlations existed between final course grade and all variables tested. The majority of these correlations were weak; however a strong correlation existed between final course grade and number of absences. Overall, these data indicate that an increase in number of absences had a negative effect on final course grade in undergraduate animal sciences courses.

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