

Factors Associated with Student Performance in an Equine Management Course¹

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Abstract

In 2007, the University of Kentucky initiated its Equine Science and Management (EQSM) undergraduate program as a stand-alone degree housed within the Department of Animal and Food Sciences (AFS). From 2007 to 2010, the Equine Management (ASC 320) course was taught as the student population changed from predominately AFS to EQSM after the new equine degree program was established. The objective of this study was to determine factors associated with student success in ASC 320 before and after the redesign of the course between 2007 and 2008. Variables in the analysis included students' major, year, pre-veterinary program of study, years of horse experience, career aspirations, hours worked outside of school and percent of possible course points. Two multivariable linear regression models were developed to evaluate the effects of selected variables on course percent; one was created for the 2007 class, the other for 2008-2010 combined. The model for the 2007 class revealed that sophomores were at a disadvantage compared to upperclassmen ($p = 0.02$) for course percent. The model for the years 2008-2010 demonstrated a small positive association with years of horse experience and course percent ($p = 0.007$). Other variables examined were not significantly associated with student performance.

Introduction

Animal science departments are evolving to accommodate changing demographics and more diverse interests of students. Some have developed programs devoted specifically to equine science and management (Buchanan, 2008). Others offer options to emphasize equine studies within an animal science curriculum (Buchanan, 2008). In 2007, the University of Kentucky

began offering an undergraduate B.S. degree program in equine science and management (EQSM), which received formal approval in early 2009. The first cohort of freshman students entered the program in the fall of 2007. Prior to that, students interested in horses could complete an equine option in the Animal and Food Sciences (AFS) undergraduate degree program and this alternative is still available to AFS students who do not wish to pursue the EQSM degree. Since its introduction, the EQSM program has grown in enrollment each year, with approximately 270 students in the program in fall 2012. The program also attracts a high percentage of out-of-state students (~65%, personal communication, R. Coleman, EQSM Director of Undergraduate Studies).

The Equine Management (ASC 320) course existed previously in the AFS curriculum as a course for animal science students pursuing the equine option. When the EQSM program was designed, ASC 320 was included among required classes for students in that major and was also retained in the AFS equine option requirements. In light of the changes in instructional programs of the AFS and EQSM degrees and the student populations they attract, this study was undertaken to evaluate existing data from students taking ASC 320 before and after the introduction of the EQSM major. The objective of the study was to determine factors associated with student success in ASC 320 before and after the redesign of the course between 2007 and 2008.

Methods

Equine Management (ASC 320) is a 3-credit course taught in the fall semester at the University of Kentucky that instructs students in a wide range of topics pertaining to the care and health of horses. The prerequisite is

¹This investigation (Paper No. 12-07-087) was carried out in connection with a project of the Kentucky Agricultural Experiment Station and is published with the approval of the director

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ASC 101 (Domestic Animal Biology), a rigorous 3-credit class that builds foundational knowledge of anatomy, nutrition, digestion and reproduction of domestic livestock species. Material is presented in two fifty-minute lectures and one three-hour laboratory session per week. Specific topics include normal health parameters (temperature, pulse, respiration) and how to measure them, digestive anatomy, physiology and nutrition, selection and management of feedstuffs, common horse diseases and prevention strategies, first aid for horses, parasite control and fecal egg counts, hoof care, management of pastures and horse facility design. In 2007, 450 of the possible 550 course points were derived from tests and the laboratory practical examination, with the remaining 100 points earned on quizzes and homework assignments. From 2008-2010, the grading was changed to decrease the emphasis on tests. In those years there were 600 possible points, 350 of which were derived from tests and the laboratory practical and 250 points earned on assignments. When first assumed by the instructor (M. Rossano) in 2007, the course was intended for juniors and seniors in the AFS undergraduate program. The topics were similar to those listed above, but also included material on horse breeds, coat colors and selection for purchase. Health topics and parasitology were not as strongly emphasized as in the present course, but equine nutrition and ration formulation was taught at a higher level, with the expectation that students had received previous instruction in animal nutrition. Between the 2007 and 2008 fall semesters, faculty mapped the curriculum for the new EQSM undergraduate degree. ASC 320 was redesigned to meet skill competencies in the EQSM course sequence while covering material appropriate for first-semester sophomores. The course is also taken by students in the AFS degree program pursuing an equine degree option and other students in the EQSM program who take the course out of sequence, as juniors or seniors. ASC 320 has been taught by its present instructor from 2007 to 2011.

On the first day of class, the students completed a questionnaire. The purpose of the questionnaire was to gain information about the interests and horse experience of the students, how much time they expect to spend working outside of class, and to determine which lab session time they will attend. Questionnaires were stored in a file cabinet after they were used for the course. In 2011, the Institutional Review Board determined that an analysis of information from the questionnaires and student academic performance in the course from 2007 to 2010 met the criteria for an exempt study, thus a retrospective analysis of the data was conducted.

Data from questionnaires and grading records were

entered in a relational database prior to analysis. Variables included student major, class level (sophomore, junior or senior), whether they were in a pre-veterinary (pre-vet) program of study, years of horse experience, career aspirations, hours they worked at jobs outside of school and their percent of possible course points, which were used to determine final letter grades. Career aspirations were reported as a short answer, and later classified as veterinarian, horse industry or undecided. Hours of work outside of school was analyzed as both a dichotomous (yes/no, the student did or did not work outside of school) and continuous variable, hours per week. Because the student population was overwhelmingly female, gender was not considered as a variable. Information on race and ethnicity was not collected by the questionnaire. Only records from students who completed the questionnaire and received a final course grade were included in the analysis.

Analysis of data was performed in SAS (version 9.2). Descriptive statistics were produced and tests of normality were conducted on continuous variables. Tests of association were performed to evaluate relationships between specific variables and the outcome of interest (final course percent) as well as associations between variables. Spearman correlation analysis was conducted on continuous variables, chi-square or Fisher's exact tests were performed when two or more categorical variables were evaluated and the Kruskal-Wallis test was used to compare continuous variables from related categories (such as year taught). Course percents were compared across years taught to determine whether statistical models should be controlled for year. Two multivariable linear regression models were developed to evaluate the effects of selected variables on course percent. One was created for the 2007 class (prior to the reorganization of the course) and the other for the years 2008-2010 combined. Variables were included in a starting, saturated model developed from preliminary analyses (with p -values < 0.25) and were eliminated using backward selection. In the final model a p -value of 0.05 or less was deemed significant, thus that variable (or group of related categorical variables) was retained in the model. If a variable did not reach statistical significance, but improved the model adjusted R^2 by its inclusion, it was retained.

Results and Discussion

The demographic distribution of the classes by year is shown in Table 1. A total of 172 students were included in the study. The largest class size was in 2009, when 53 students completed the course, and the smallest class in 2007 was comprised of 37 students. Because sophomores in the EQSM degree program did not begin taking the

course until 2008, the 2007 class was comprised mostly of AFS students; one geography major and one non-degree student also were included. In the years that followed, the percent of EQSM majors increased quickly to over 90%; the remaining students were of the AFS major. In 2007, 27% of students were pursuing a pre-vet program. This percent was lower in subsequent years, ranging from 8-15%, but the difference did not reach statistical significance when pre-vet status was tested for association with year taught. A significantly higher proportion of AFS students were pre-vet, compared to EQSM ($p < 0.0001$).

Means and standard deviations of the continuous variables in the study are shown in Table 2. Final course percent ranged from 59-95% in 2007, with a mean of 84.3% and for the years 2008-2010 it ranged from 64-97% with a mean of 83.2%. Course mean percent decreased slightly over the time the course was taught but was not significantly different by year and thus was not included in the regression model for classes from 2008-2010. Years of horse experience was lowest in the 2007 class; once EQSM students began to predominate, horse experience increased, however this difference did not reach statistical significance ($p = 0.12$). Hours worked outside of class rose from 2007 to 2008, then declined in the remaining two years. Spearman correlation analysis revealed no associations between course percent, years of horse experience and hours of work in the 2007 class, but in the 2008-2010 classes, years of horse experience was positively associated with course percent ($r = 0.21$, $p = 0.01$). Students who considered themselves to be pre-vet had a higher mean course percent (87.8%) in 2007 compared to other students (83.0%), but the difference was not statistically significant ($p = 0.11$). In 2008-2010, pre-vet students averaged 85.3% and other students averaged 82.9%. This difference was also not significant ($p = 0.24$). Course percent of students who worked outside of school (versus those who did not) did not differ in either the 2007 or 2008-2010 students, despite the fact that pre-vet students worked significantly more hours in the latter population ($p = 0.04$).

The final linear regression models are shown in Table 3. The model for the 2007 students had the highest adjusted R^2 (0.23) when a number of nonsignificant variables were retained. The only variable to reach statistical significance was sophomore status. There, it was apparent that sophomores were at a 7% disadvantage in course percent compared to juniors and seniors also taking the class. In the model for students from 2008-2010, after the course was redesigned for sophomore EQSM students, the only variable to attain significance in the multivariable model was years of horse experience. No other variable was significant or

Table 1. Numbers of students by year and percent EQSM major, sophomores and students pursuing a pre-veterinary program of study.

Year	N Students	%EQSM	%Sophomores	%Pre-Vet
2007	37	0	22	27
2008	41	68	44	15
2009	53	92	59	8
2010	41	95	61	15
Total	172			

Table 2. Mean course percent, years of horse experience and hours worked per week, with standard deviations (in parentheses).

Year	Course Percent	Years Horse Experience	Hours Worked
2007	84.3 (0.08)	8.5 (7.1)	15.4 (11.3)
2008	84.0 (0.07)	11.3 (5.4)	17.7 (13.7)
2009	83.2 (0.07)	11.4 (6.7)	11.3 (10.9)
2010	82.5 (0.08)	10.8 (5.0)	10.4 (12.3)

Table 3. Multivariable linear regression models for course percent in years 2007 and 2008-2010.

Variable	b	SE (b)	P-value
Model 1: Year 2007			
Model Adjusted R² = 0.23			
Intercept	0.857	0.029	<0.0001
Years of horse experience	0.003	0.002	0.11
Hours of work outside of school	-0.002	0.001	0.07
Pre-veterinary program (compared to all others).	0.039	0.029	0.20
Sophomore status (compared to all others).	-0.073	0.030	0.02
Model 2: Years 2008-2010			
Model Adjusted R² = 0.05			
Intercept	0.799	0.014	<0.0001
Years of horse experience	0.003	0.001	0.007

improved the model R^2 by its inclusion. The adjusted R^2 was 0.05 and years of horse experience had a negligible effect on course percent (0.3%), thus there may be other factors not examined in the present study that would be more helpful in explaining student performance in ASC 320 in its current format.

The results of the study indicated that the disadvantage for sophomores compared to upperclassmen did not carry over into the model from 2008-2010. This suggests that the redesign of the course for sophomores was successful and the lack of significant differences in final course percent over time supports that the changes in course content did not affect student performance. In a study of animal science students in an animal science curriculum, McMillan et al. (2009) found that year of study was not associated with course percent, but that study encompassed courses across the curriculum, in which students would not necessarily be taking upper-level courses as underclassmen. While there was a significant association with years of horse experience and course percent, the practical effect was small, suggesting that

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tests and assignments did not require students to draw on previous experience to do well in the course. It was surprising that hours worked outside of school was not associated with performance in the course, but this result should be interpreted with caution; there was no follow-up survey for the instructor to capture changes in work hours and employment status over the course of the semester, thus the expected hours reported by the students at the beginning of the semester may have differed from the actual hours worked. In addition, it is possible that pre-veterinary students were engaged in volunteer work at veterinary clinics that they did not consider “work” when they filled out the questionnaire. The use of existing data from questionnaires and grading records created some limitations for the study and this is evident from the R^2 values of the models. A more comprehensive study could include measurements of other variables, such as overall grade point average, hours spent studying for the class, hours spent with clubs and fraternal organizations and other activities that students engage in. This would allow investigators to explain more of the variation in student performance in the course than the present study’s models could.

Two previous studies have investigated the association between equine experience and level of interest in pursuing an equine-related career with performance in equine management courses (Lawrence, 1987; Pratt-Phillips and Schmitt, 2010). Both found that level of horse experience did not significantly affect course grade. Both acknowledged the limitation of relying on self-reporting from students for this information. The present study used self-reported years of horse experience rather than level, and did identify a modest positive significant association. Together, all three studies demonstrate that students do not need extensive horse experience to succeed in equine management courses. The present study did not attempt to include interest in a career in the horse industry as a variable because the EQSM students all reported some kind of career aspiration involving horses. The courses examined in the previous studies (Lawrence, 1987; Pratt-Phillips and Schmitt, 2010) were taken by a wider variety of students from animal science and other majors and included those who were not focused predominantly on horses. This allowed for comparisons based on intent to work in the horse industry (including equine veterinary medicine). The present study examined career aspirations as variables for “veterinarian,” “equine industry” and “undecided” and none was significantly associated with course percent. Even students who were undecided about specific careers still expressed an interest in working in the equine industry in some capacity, thus it was not possible to test for that association.

The student population studied here was somewhat different from what has been previously reported in similar studies on animal science majors. Other studies have reported higher percentages of students who considered themselves to be pre-vet. Peffer (2010) reported that in 2007-2008, 68% of the animal science majors taking an introductory animal science class were oriented towards careers in veterinary medicine. In the 1980’s, Edwards (1986) and Mollet and Leslie (1986) reported in separate studies that 59% and 52% of students in animal science classes were taking pre-vet course work. In all three studies, student populations were comprised largely of freshman and sophomore students. The AFS students taking ASC 320 in 2007 were mostly upperclassmen, thus it is possible that by the time those students reached junior or senior status, they had revised their career goals. The rigorous course work in chemistry and physics required by a pre-vet program is another likely factor that drives student attrition or changes of major away from animal sciences. The low proportion of mostly sophomore students pursuing pre-vet course work in the 2008-2010 ASC 320 classes suggests that the EQSM program is attracting students who want to work with horses, but mostly in careers other than veterinary medicine. Further studies are underway at the University of Kentucky to describe and assess the EQSM students, identify variables associated with student success and to determine what types of careers alumni pursue.

Summary

In this study, the variables major, class level (sophomore, junior or senior), pre-vet status, years of horse experience, career aspirations, and hours worked at jobs outside of school were explored for association with final course grade percentage. For 2007 students, only the class level variable was associated with course grade percentage, with sophomores obtaining lower scores than juniors or seniors. For 2008-2010 students, years of horse experience was statistically significant within the model; however, this variable does not appear to be a good predictor of course grade. By redesigning the course to fit within a new equine curriculum, sophomore students may have become better accommodated while students with more horse experience may have gained a very slight advantage. Future studies will continue to examine EQSM students and program at the University of Kentucky.

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