Relationship between Academic Engagement, Self-Reported Grades, and Student Satisfaction[1]

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Abstract

The purpose of this study was to describe self-reported grades, scores on 10 academic engagement indicators and satisfaction of senior Agricultural, Food and Life Sciences (AFLS) students (n = 144) at a mid-south land grant university and to determine the relationship between grades, academic engagement and student satisfaction. Students were satisfied with their experiences at the university. They reported being often engaged in 8 of the 10 indicators, but only sometimes engaged in indicators measuring Quantitative Reasoning and Student-Faculty Interactions. All engagement indicators except Reflective and Integrative Learning and Quantitative Reasoning were significantly (p < 0.05) related to student satisfaction; there was no significant correlation between self-reported grades and satisfaction. Two faculty-related engagement indicators, Student-Faculty Interaction and Effective Teaching, had low positive correlations (r = 0.25) with satisfaction. A linear combination of three engagement indicators, Quality of Interactions, Supportive Environment, and Learning Strategies, explained a significant (p < 0.05) percentage (30.0%) of the variance in student satisfaction. These results confirmed the importance of positive interpersonal relationships, quality study habits, and student support services to student satisfaction. Further research is needed to examine the relationship between financial stability, family and work responsibilities, and academic and career goals and student satisfaction.

Introduction

Student satisfaction has been defined as a subjective attitude based on the student's evaluation of his or her educational experiences (Athiyaman, 1997; Elliott, 2002; Elliott and Shin, 2002). Satisfaction results when educational experiences meet or exceed the student's expectations, while dissatisfaction results when experiences do not meet expectations (Elliott, 2002; Hom, 2000). According to Elliott (2002), student centeredness and instructional effectiveness are primary contributors to enhanced levels of student satisfaction. Strahan and Crede (2015) found only a weak, positive correlation between grades and student satisfaction. Moreover, Mark (2013) asserted that students are satisfied when their academic needs are fulfilled and they receive a quality education that is valued in the job market. Student satisfaction is positively related to student retention, motivation, recruiting, and fundraising (Elliott and Shinn, 2002). Additionally, institutions with satisfied graduates also tend to have higher levels of public and political support (Weerts et al., 2008). Therefore, it is beneficial for colleges and universities to focus on improving student satisfaction (Saunders, 2014).

Academic engagement is defined as the time and energy that students devote to educationally productive activities (Carini et al., 2006). Kuh (2003) stated that the premise of academic engagement is deceptively simple and even self-evident: When students study a subject more, they learn more about it. Academic engagement is one of the best predictors of learning and personal development (Carini et al., 2006). One

of the most commonly used methods of measuring academic engagement is the National Survey of Student Engagement (NSSE). Since 2000, NSSE has been completed by students at over 1500 U.S. and Canadian colleges and universities (McCormick et al., 2013). NSSE measures student engagement using 10 engagement indicators: (1) Higher-Order Learning, (2) Reflective and Integrative Learning, (3) Learning Strategies, (4) Quantitative Reasoning, (5) Collaborative Learning, (6) Discussions with Diverse Others, (7) Student-Faculty Interaction, (8) Effective Teaching Practices, (9) Quality of Interactions, and (10) Supportive Environment. Pascarella et al. (2010) found each of these engagement indicators, except Student-Faculty Interaction, to be significantly related to important academic and/or personal development outcomes. Pascarella et al. (2010) posited that the lack of a significant relationship between Student-Faculty Interaction and any outcome variable was likely because of greater faculty interaction with both students who excel and with those who struggle.

Johnson et al. (2009) used NSSE data to compare agriculture and non-agriculture students and found that both freshmen and senior agriculture students had significantly higher scores on the Student-Faculty Interaction engagement indicator. However, the researchers found no significant difference in satisfaction between agriculture and non-agriculture students. In the Johnson et al. (2009) study no attempt was made to explore the relationship between academic engagement and student satisfaction.

The purpose of this study was to examine the relationship between 10 behavioral measures of student engagement, self-reported academic achievement, and student satisfaction among senior Agricultural, Food and Life Sciences (AFLS) students attending a mid-South land grant university. Specific objectives were to: (1) describe the academic engagement, self-reported grades, and satisfaction of senior AFLS students; (2) determine the relationships between academic engagement indicators, self-reported grades, and satisfaction among senior AFLS students; and (3) determine if a single or linear combination of engagement indicators and/or self-reported grades could explain a significant portion of the variance in the satisfaction of senior AFLS students.

Methods

The population for this study included all AFLS seniors (N = 588) enrolled during the spring 2013 semester at the University of Arkansas (Office of Institutional Research, 2013a). For the spring 2013 NSSE administration, a random sample of 370 AFLS seniors received email messages inviting them to complete the NSSE; a link embedded in the email allowed participants to access the on-line survey. Data were collected from 144 seniors for a 38.9% response rate; this response rate was higher than the overall university response rate of 33.5% (Office of Institutional Research, 2013b).

The percentage of AFLS seniors (10.3%) included in the university sample (n = 3,586) closely approximated the percentage of AFLS students (9.9%) in the senior class (N = 5,966) (Office of Institutional Research, 2013a).

To test for non-response bias, respondents were compared to the population of AFLS seniors on the available demographic variables of gender and ethnicity (Miller and Smith, 1983) using demographic data obtained from the university Office of Institutional Research (2013a). Chi square analyses found no statistically significant (p < 0.05) differences in gender or ethnicity between the respondents and the population. Kuh (2003) compared a national sample of NSSE non-respondents (via telephone interviews) with NSSE respondents and concluded that "few meaningful differences exist between respondents and non-respondents in terms of their academic engagement" (p. 13). Thus, based on the demographic analysis and the findings of Kuh (2003), the researchers judged these findings as generalizable to the population.

The 2013 NSSE contained 10 multi-item engagement indicators (NSSE, 2013a): (1) Higher-Order Learning (4 items), (2) Reflective and Integrative Learning (7 items), (3) Learning Strategies (3 items), (4) Quantitative Reasoning (3 items), (5) Collaborative Learning (4 items), (6) Discussions with Diverse Others (4 items), (7) Student-Faculty Interaction (4 items), (8) Effective Teaching Practices (5 items), (9) Quality of Interactions (5 items), and (10) Supportive Environment (8 items). For items in 9 of the 10 indicators, students rated the frequency (or extent) which they engaged in a specific behavior during the current academic year using a 1 - 4 scale [1 = Never (or Very Little); 2 = Sometimes (or Some); 3 = Often (or Quite a Bit); and 4 = Very Often (or Very Much)]. Students rated items in the Quality of Interactions indicator using a 1 - 7 anchored scale (1 = Poor and 7 = Excellent).

After administration, each engagement item was converted to a 0 to 60 scale and the rescaled items for each engagement indicator were averaged. An engagement indicator score of 0 represented an individual answering at the bottom of the scale for each item in the indicator, while a score of 60 represented an individual responding at the top of the scale for each item in the engagement indicator (NSSE 2013b). These scale conversions were made by NSSE staff and included in the data set provided to the researchers.

NSSE (2015) reported coefficient alpha engagement indicator reliabilities ranging from 0.77 (Learning Strategies) to 0.90 (Discussions with Diverse Others) for the 2013 NSSE. For 2013 University of Arkansas senior AFLS respondents, coefficient alpha reliability estimates ranged from 0.70 (Learning Strategies) to 0.92 (Discussions with Diverse Others). Extensive testing (NSSE, 2015) has shown that NSSE possess construct, content, known groups, and concurrent validity.

Student satisfaction was measured by responses to two NSSE items. The first item asked students to evaluate their entire educational experience at the University

of Arkansas on a 1 - 4 scale (1 = Poor; 2 = Fair; 3 = Good; and 4 = Excellent). The second item asked students if they could start over again would they choose to attend the University of Arkansas; this item was also assessed on a 1 - 4 scale (1 = Definitely No; 2 = Probably No; 3 = Probably Yes; and 4 = Definitely Yes). Responses to these two items were averaged for each respondent and used as a measure of satisfaction. In interpreting the mean satisfaction score, the following real limits and descriptors were used: 1.0 to 1.75 = Dissatisfied; 1.76 to 2.50 = Somewhat Dissatisfied; 2.51 to 3.25 = Somewhat Satisfied; and 3.26 - 4.0 = Satisfied. For 2013 University of Arkansas respondents, the coefficient alpha reliability estimate for student satisfaction was 0.79.

Respondents self-reported their grades in response to the question, "What have been most of your grades up to now at this institution?" Eight response options were provided, ranging from "A" to "C- or below." Cole et al. (2012) evaluated the validity of NSSE self-reported grade data by comparing them to institutionally-reported GPAs for 12,650 undergraduates participating in the 2011 NSSE and found "A" students were very accurate in their reporting (91.3% match), "B" students were fairly accurate (70.0% match), and "C" students were least accurate (42.5% match). Kuncel et al. (2005) concluded self-reported grades can be useful, but caution must be exercised in interpreting results.

After institutional IRB protocol approval, the university Office of Institutional Research provided the researchers with the raw data file that included AFLS senior student responses (n = 144) to the spring 2013 administration of NSSE. To preserve respondent anonymity, the data file did not contain any information allowing researchers to match responses to specific individuals.

Data were analyzed (in SAS® 9.3) using descriptive statistics, bivariate correlations and linear multiple regression. The 0.05 level of significance was set a priori for correlation analysis and for the overall significance test in multiple regression; however, the 0.10 level of significance was set, also a priori, for testing significance of individual predictor variables (Hair et al., 1998). The descriptors suggested by Davis (1973) were used to describe the magnitude of bivariate correlations; 0.00 to 0.09 = negligible, 0.10 to 0.29 = low, 0.30 to 0.49 = moderate, 0.50 to 0.69 = substantial, and 0.70 to 1.00 - very strong.

Table 1. Means and Standard Deviations for Academic Engagement Variables and Student Satisfaction

Variable	n	M	SD	Descriptor[x]
Higher-Order Learning	135	37.03[z]	14.72	Quite a Bit
Reflective / Integrative Learning	137	36.34[z]	11.46	Often
Learning Strategies	119	38.15[z]	13.67	Often
Quantitative Reasoning	134	29.80[z]	16.55	Sometimes
Collaborative Learning	135	34.74[z]	14.29	Often
Discussions with Diverse Others	121	41.69[z]	16.31	Often
Student-Faculty Interaction	136	26.95[z]	17.72	Sometimes
Effective Teaching Practices	136	40.59[z]	13.99	Often
Quality of Interactions	119	44.08[z]	10.34	Good
Supportive Environment	116	33.31[z]	12.43	Quite a Bit
Student Satisfaction	114	3.39[y]	0.63	Satisfied

[z]Converted to a 0 to 60 scale where higher scores represented higher levels of engagement.

[y]Measured on a 1 to 4 scale where 1 = low satisfaction and 4 = high satisfaction.

[x]Based on descriptors supplied by NSSE (2013b).

Results

Of the 144 senior AFLS students responding to the 2013 NSSE, a majority were female (72.2%) and of non-minority (83.3%) ethnicity. Approximately 9 in 10 seniors reported earning mostly grades of B or higher (87.4%) while 42.3% reported earning mostly A's (27.0%) or A-'s (15.3%).

Objective 1

Senior AFLS students rated Quality of Interactions, Discussions with Diverse Others, and Effective Teaching Practices as the most frequently occurring engagement indicators (Table 1). Eight of the 10 engagement indicators were rated as occurring "often" (or "quite a bit" or "good") while two indicators (Quantitative Reasoning and Student-Faculty Interaction) were rated as occurring "sometimes." There was a large degree of variability associated with each engagement indicator with coefficients of variation ranging from 23.4% (Quality of Interactions) to 65.8% (Student-Faculty Interaction).

Overall, students were "satisfied" with their college experiences as indicated by a mean of 3.39 (SD = 0.63) on the two-item satisfaction variable (Table 1). With a coefficient of variation of 18.6%, there was less relative variation in student responses to the satisfaction variable compared to the engagement indicators.

Objective 2

Eight of 10 engagement indicators had significant (p < 0.05) positive correlations with student satisfaction (Table 2). Using descriptors suggested by Davis (1973),

Table 2. Intercorrelations and Cronbach's Alpha Reliability Estimates for Predictor and Criterion Variables

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Higher-Order Learn. (X1)	(0.85)											
Reflect./Integ. Learn. (X2)	0.45***	(0.85)										
Learning Strategies (X3)	0.27**	0.25**	(0.70)									
Quant. Reasoning (X4)	0.51***	0.43***	0.19[NS]	(0.89)								
Collaborative Learn. (X5)	0.33***	0.34***	0.14[NS]	0.43***	(0.83)							
Discuss./Div. Others (X6)	0.35***	0.33***	0.46***	0.20*	0.28**	(0.92)						
Student-Fac. Interact. (X7)	0.40***	0.32**	0.19*	0.35***	0.46***	0.30**	(0.87)					
Eff. Teaching Prac. (X8)	0.35***	0.11[NS]	0.17[NS]	0.38***	0.16[NS]	0.10[NS]	0.32***	(0.87)				
Quality of Interact. (X9)	0.16[NS]	0.12[NS]	0.24*	0.12[NS]	0.11[NS]	0.29**	0.26**	0.40***	(0.75)			
Supportive Env. (X10)	0.30**	0.28**	0.26**	0.23*	0.19*	0.32***	0.25**	0.23*	0.32***	(0.87)		
Self-Report. Grades (X11)	0.12[NS]	0.04[NS]	0.21*	0.05[NS]	-0.04	0.17[NS]	0.25**	0.12[NS]	0.15[NS]	0.01[NS]	(na)	
Student Satis. (X12)	0.31***	0.09[NS]	0.29**	0.15[NS]	0.26**	0.25**	0.25**	0.25**	0.43***	0.37***	-0.01[NS]	(0.79)

Note. Reliability estimates (Cronbach's alpha) appear on the diagonal above correlation coefficients.

[NS]Not significant; *p < .05; **p < .01; ***p < .001.

these correlations ranged from small to moderate. Supportive Environment (r = 0.37), Quality of Interactions (r = 0.43), and Higher-Order Learning (r = 0.30) were moderately correlated with student satisfaction (Davis, 1973). Two faculty-related engagement indicators, Student-Faculty Interaction and Effective Teaching, had low (Davis, 1973) positive correlations with student satisfaction. The Reflective and Integrative Learning and the Quantitative Reasoning engagement indicators and self-reported student grades were not significantly related to student satisfaction.

The inter-correlations between the 11 potential predictor variables (10 engagement indicators and self-reported grades) ranged from non-significant to moderate (Davis, 1973). Of particular interest, only two engagement indicators, Quantitative Reasoning and Student-Faculty Interaction, were significantly related to self-reported grades and these correlations were low (Davis, 1973).

Objective 3

Prior to regression analysis, data were evaluated for outliers; regression diagnostics were used to determine if data met the assumptions of linearity, homoscedasticity, and normality of the error term distribution; and predictor variables were examined for multicollinearity (Hair et al., 1998).

Examination of the plot of residuals revealed four outliers; these outliers were removed and the data were reanalyzed. Linearity was assessed through visual evaluation of each potential predictor variable plotted against the dependent variable. All predictor variables exhibited linearity with student satisfaction. Homoscedasticity of residuals was assessed graphically and because no pattern of increasing or decreasing residuals was found, this assumption was determined to have been met (Hair et al., 1998). The results of the Shapiro-Wilk test (W = 0.98, p = 0.42) indicated the assumption of normality of residuals was met. Finally, the variance inflation factors (VIF) ranged from 1.24 to 1.57, well below the VIF of 10.0 suggested by Hair et al. (1998) as indicating a potential multicollinearity problem.

Student satisfaction was regressed on a linear combination of the eight statistically significant predictor variables. The resulting regression equation was significant [F (8, 88) = 4.63, p < 0.0001] and explained 30% of the variance in student satisfaction. According to Cohen (1988), the R^2 of 0.30 (adjusted R^2 = 0.23) represents a large effect. As shown in Table 3, Quality of Interactions, Supportive Environment, and Learning Strategies were all statistically significant (p < 0.10) in predicting student satisfaction. The remaining five engagement indicators did not explain statistically significant increments of variance in student satisfaction. Examination of the Beta weights (β) and squared semi partial correlations (sr^2) indicated Quality of Interactions was the best predictor of student satisfaction (explaining 6.0% of unique variance), followed by Supportive Environment (2.8%), and Learning Strategies (2.4%).

Table 3. Beta Weights and Squared Semipartial Correlations Obtained in Multiple Regression Analyses Predicting Student Satisfaction

Predictor	B	SE B	β	t	sr²
Quality of Interactions	0.016	0.006	0.293	2.73***	0.060***
Supportive Environment	0.008	0.004	0.186	1.87*	0.028*
Learning Strategies	0.007	0.004	0.173	1.74*	0.024*
Collaborative Learning	0.005	0.004	0.133	1.26NS	0.013NS
Higher-Order Learning	0.004	0.004	0.102	0.95NS	0.007NS
Discussions w/Diverse Others	-0.001	0.004	-0.041	-0.39NS	0.001NS
Effective Teaching Practices	0.000	0.004	0.010	0.09NS	0.000NS
Student-Faculty Interaction	0.000	0.003	0.004	0.03NS	0.000NS

Note. R^2 = 0.30; adjusted R^2 = 0.23.
NSNot significant. *p < 0.10. **p < 0.05. ***p < 0.01.

Summary and Discussion

This study sought to describe and determine the relationships between 10 academic engagement indicators, self-reported grades, and student satisfaction among 144 senior AFLS students at a mid-south land grant university. On the 0 - 60 scale, seniors rated the Quality of Interactions engagement indicator highest and Student-Faculty Interactions lowest. Students reported fairly high levels (often, quite a bit, or good) of engagement in 8 of the 10 indicators, but reported lower levels (sometimes) of engagement in Student-Faculty Interaction and Quantitative Reasoning. There was a high degree of variability within each academic engagement indicator suggesting that students in the same college can have very different academic experiences, likely depending on their own specific majors and particular interests and motivations.

Senior AFLS students were satisfied with their experiences at the University of Arkansas as indicated by a mean satisfaction score of 3.39 (SD = 0.63) on a four-point scale. Apparently, AFLS seniors' experiences at the University of Arkansas largely met their expectations (Mark, 2013) and, consequently, the university and college can expect these future alumni to be potential sources of financial (Elliott and Shin, 2002) and personal (Weerts et al., 2008) support.

Self-reported grades were not significantly correlated with student satisfaction or with any engagement indicator other than Learning Strategies and Student-Faculty Interaction, where only low positive correlations were found. The finding of no relationship between grades and satisfaction is largely consistent with Strahan and Crede (2015) who found only a weak correlation between grades and student satisfaction. The lack of any significant relationship between grades and 8 of the 10 engagement indicators is surprising, given the link between student engagement and academic achievement reported by Carini et al. (2006). However, because self-reported grades of unknown validity (Kuncel et al., 2005) were used in this analysis, no substantive conclusion can be reached; further research examining the relationships between university-reported official grade point averages and each of the 10 engagement indicators and student satisfaction is warranted.

Eight of the 10 engagement indicators had significant positive correlations with student satisfaction, with magnitudes ranging from low to moderate (Davis, 1971).

Reflective and Integrative Learning and Quantitative Reasoning were not significantly related to student satisfaction. Student-Faculty Interaction had a low positive correlation with both student satisfaction and student grades while Effective Teaching had a low positive correlation only with student satisfaction. Further research should be conducted to more fully understand the relationship between these two faculty-related engagement indicators and student grades and satisfaction.

A linear regression equation containing three engagement indicators (Quality of Interactions, Supportive Environment and Learning Strategies) was statistically significant and explained 30% of the variance in student satisfaction. Quality of Interactions was the most important predictor explaining approximately 6.0% of the unique variance, followed by Supportive Environment (2.8%) and Learning Strategies (2.4%). These findings are consistent with Elliott (2002), who reported institutional student-centeredness is a primary contributor to student satisfaction. However, Elliott's (2002) contention that instructional effectiveness is related to student satisfaction is supported only to the extent that effective instruction contributed to the use of good learning and study practices.

The Quality of Interactions engagement indicator asked students about their relationships with other students, their academic advisors, faculty, student services staff, and other administrative staff and offices. The Supportive Environment indicator asked students about the university's emphasis on academics and academic support services, support for non-academic responsibilities (work and family) and providing social, cultural and recreational opportunities. Finally, the Learning Strategies indicator asked students how often they identified key information in readings, reviewed notes after class, and summarized class material. Thus, in plain language, the best predictors of satisfaction for AFLS seniors were quality student-faculty-staff relationships, a stimulating and supportive campus environment and the extent to which the student practiced good learning habits. AFLS faculty and administrators, as well as campus administrators, should place special emphasis on enhancing each of these in order to improve student satisfaction.

While this study confirmed the relationship of positive interpersonal relationships, quality student support services, and effective learning and study practices to higher levels of student satisfaction, these three factors combined explained only 30% of the variance in the satisfaction of senior AFLS students. Further research is recommended to identify how additional factors, such as financial stability, family and work responsibilities and academic and career goals, contribute to student satisfaction.

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