

Effect of Class Standing, Gender and Academic Attribution on Resiliency and Goal-Setting Strategies among Animal Science Students¹

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Abstract

Development of the student as an autonomous learner is one of the primary goals of higher education. Self-regulated learning is dependent on a number of adaptive strategies, including student resiliency and effective goal-setting, concepts which have been relatively unexplored in the agricultural sciences. Therefore, the objective of this study was to evaluate perceptions of resiliency and goal-setting behavior among undergraduate students enrolled in an introductory animal science course. On the first day of class, students (n=157) completed an anonymous questionnaire related to goal-setting strategies, resiliency and academic attribution. Student gender and class standing (freshman, sophomore or junior) were also reported. Most (57.6%) students attributed academic success or failure to factors outside their control. Means for resiliency and goal-setting strategies were numerically highest for upperclassmen and in most cases differed statistically from those observed for freshmen or sophomores. Correlations between behaviors that facilitate goal attainment and capacity for change were positive and low to moderate in magnitude. Results from this study indicate opportunity for instructional intervention to improve goal attainment strategies and student resiliency, two factors associated with academic achievement and autonomous learning.

Introduction

The changing face of agriculture has prompted a re-examination of pedagogical practices in higher education (NRC, 2009; Estep and Roberts, 2011). New emphasis on agriculture's broad-based applicability to

solve societal challenges related to global food security, energy production and human, animal and environmental health necessitates educational programs that produce a more broad-based graduate, with transferable skills that allow for lifelong learning and continual adaptability to meet the demands of an ever-changing workplace. For many faculty members in the agricultural sciences, this represents a fundamental shift in practice (NRC, 2009; Stedman and Adams, 2012) from traditional instructor-centered teaching methods to a more constructivist, student-centered learning landscape in which students receive explicit instruction on how to develop successful habits of autonomous learning.

Self-regulated learning (SRL) is an adaptive strategy designed to facilitate learning goal attainment in dynamic social and physical environments. SRL describes processes necessary for the self to direct knowledge and skill acquisition (Zimmerman, 1989) and therefore promotes deep learning, higher-order thinking skills and mastery over subject matter. According to Pintrich (2004), effective self-regulated learners possess two main attributes: 1) they have some form of control and ownership over their behaviors, motivation and affect and cognition and 2) they are goal-oriented. As a result, central to SRL are concepts of attribution and goal-setting. For effective SRL, knowledge creation and skill acquisition must occur at least in part as an acknowledged result of the learner's actions as he or she attempts to achieve a predetermined goal. Effective goals are specific, parsimonious and consistent with one's motivation for achievement. Goals must be defined before students

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can become “metacognitively, motivationally and behaviorally active” in their attainment (Zimmerman, 1989). Goals focus learner effort, allow for realization of achievement and promote motivation and satisfaction. However, inappropriate goal-setting can have negative implications. Learning goals with too narrow a focus may be associated with inflexibility and ultimately limit success. Goals which are too distal or vaguely defined may decrease student motivation and effort. Demands for strict commitment to goal attainment can also disrupt school-life balance (Garavala and Gredler, 2002). Students coached in appropriate goal-setting behavior consistently demonstrate improved academic achievement (Zimmerman et al., 1992) and were more likely to exhibit self-efficacy, resilience and be classified as proactive, self-regulated learners.

Agricultural colleges offer unique contexts in which to study SRL, as they are largely grounded in a well-known learning model (i.e., the land-grant system of discovery, translation and dissemination) and traditionally rich in the use of constructivist, experiential learning paradigms for student education (Estep and Roberts, 2012; Splan et al., 2011a; Andreasen, 2004). Although relationships among goal-setting strategies and such constructs as resiliency and attribution have been generally described among undergraduate psychology or education majors, they are poorly characterized among student populations largely naïve to explicit instruction in metacognition, such as those in the agricultural sciences. Effective design of educational strategies to promote SRL and appropriate goal-setting is population-dependent; therefore, the objective of this study was to explore factors which influence self-reported goal-setting behavior and the closely-related constructs of self-efficacy and attribution, among students enrolled in an introductory course in the agricultural sciences.

Materials and Methods

Undergraduate students (n=157) enrolled in three consecutive semesters (Fall 2011, Spring 2012 and Fall 2012) of an introductory animal science course at a land-grant university were recruited for this study. The research protocol was approved by the Institutional Review Board and participant consent was implied from completion of the anonymous, self-report instruments. The selected course is required for all animal science majors and was chosen for its large class size, class level representation (81 freshmen, 34 sophomore and 42 juniors) and instructor amicability to student questioning. Four senior students were enrolled in the course but were eliminated from the final dataset due to small sample size. Eighty-three percent (n=130) of the students were female.

On the first day of class, students voluntarily completed questionnaires related to goal-setting strategies, resiliency and academic attribution. Student gender and class standing (freshman, sophomore or junior) were also reported.

Survey Instruments

Academic attribution: Academic attribution describes the reason(s) given by students to explain success or failure in a course or on a task after it has happened (Weiner, 1985). Attributions can be powerful determinants of student achievement and correlate strongly with task persistence, future effort, student mental health and self-esteem (Tavakolizadeh and Qavam, 2011; Weiner, 2010). In this study, students were asked to answer two open-ended questions relative to controllability of academic attribution: Think of the last time you did really well (poorly) in a class or course. What was the main reason for your success (failure)? Student responses were classified as to whether they attributed both their achievement and failure to factors over which they had control (e.g., effort, strategy) or to factors or those over which they had no control (e.g., inherent ability, task difficulty, instructor actions or characteristics which could not be manipulated). Data which could not be attributed clearly to controllability were excluded from analyses.

Goal-setting behavior: A self-reporting assessment of goal-setting was developed by Martinez-Pons (2000) in his Five-Component Scale of Self-Regulation. The modified version of this goal-setting instrument uses 15 questions answered on a four-point categorical frequency scale (never, sometimes, frequently, all the time) and has been more recently employed by Maclellan and Soden (2006) among first-year undergraduates majoring in primary education.

Resiliency: Resilience indicates an individual’s capability for positive transformation in the face of uncertainty or actual change (Lifton, 1993) or one’s ability to maintain, improve and recover mental health following stressful life events (Neill and Dias, 2001; Wolin and Wolin, 1993). Resilient individuals are marked by self-determination, emotional intelligence, adaptability, problem-solving and critical thinking skills and possess an internal locus of control, sense of humor and general hardiness (Connor and Slear, 2009; McMahon, 2006; Niell and Dias, 2001). College students with higher resiliency were more likely to persist to graduation (Donald et al., 2004) and demonstrate improved metacognitive development and academic performance (Harnish, 2005). A self-reporting resiliency instrument was developed and validated by Wagnild and Young (1993) and has been modified and shortened by

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Niell and Dias (2001) to create a 15-item questionnaire (RS15). The instrument uses a seven-point Likert scale and has a high reliability (Cronach's $\alpha=.91$).

Mean differences for fixed effects of gender, class standing and student attribution were tested via PROC NPAR1WAY of SAS (SAS v9.2, Cary, NC) using Wilcoxon tests for pairwise comparisons and the Kruskal Wallis test for variables with more than two groups (e.g., class standing). Chi-square tests were performed to investigate relationships between categorical variables (e.g., academic attribution and gender). Relationships among the ordinal variables of goal-setting behavior and resiliency were investigated using Spearman rank correlations. Significance is reported at the $P<0.05$ level.

Results and Discussion

Academic Attribution

More than half of students tended ($p=0.089$) to see themselves as victims of their learning environment, with 57.6% of students attributing their academic success or failure to factors outside their own control. Whether or not students believed these factors were internal or external, stable or malleable, was not tested in this study and the question of attribution applied only to one instance, rather than to a general causal belief structure as described in other work (Weiner, 2010).

Relatively equal numbers of male students saw themselves as active ($n=9$) vs. passive ($n=11$) members of their learning communities ($p=0.655$), while a greater percentage of female students tended ($p=0.078$) to attribute academic outcomes to noncontrollable factors. Within the literature, there are mixed views regarding effects of gender on overall academic achievement. Although there is evidence that males tend to outperform females in specific disciplines and vice versa (Haynes Stewart, 2011), these data are not available for the animal sciences.

There was a significant effect of class standing ($p=0.049$) on academic attribution. Interestingly, while no differences in academic attribution were reported for freshmen or junior students ($p>0.617$), only 8 of 28 sophomores (29%) perceived academic success or failure to result from their own actions or strategies as a learner ($p=0.012$). It is unclear why this relationship exists, or if it was instead spurious; effects of class standing on academic attribution have not been previously addressed in the literature.

Significant positive correlations have been reported between academic locus of control and student grades (Cassidy and Eauchas, 2000; Cassidy 2007). Encouragingly, it appears

students' causal explanations of poor performance can be 'rewired' to promote development positive strategies for academic goal attainment (Weiner, 2010) and there is empirical evidence to support this argument (Haynes et al., 2009; Haynes Stewart et al., 2011; Perry et al., 1993). In students experiencing self-doubt, in which they attribute success to external factors and failure to their own unchanging deficiencies, reattribution training has resulted in improved academic performance and positive behavioral change (Wilson et al., 2002). This is consistent with Zimmerman's (1989) model of successful self-regulated learning, where higher-achieving students consider both failure and success to be due to malleable factors (Nokelainen et al., 2007).

Goal-setting

Means for self-reported frequencies of goal-setting behaviors (G1-G14) are reported in Table 1. Although such a questionnaire does not assume students benefit from, or appreciate the role of goal-setting in their learning efforts, study participants on average reported "frequently" setting goals to guide their academic work (G1). Behaviors with the highest frequencies included those related to setting goals that stretched the learner's capacity and understanding (G4, G5 and G8) and clarity of goals (G3 and G10). Goal-setting behaviors related to time management (G7 and G14) and organizational prowess (G12 and G13) were performed less frequently. Goal-setting strategies with the lowest reported frequencies were those that involved elements of social guidance, or checking with others such as peers, parents or tutors (G2, G6, G9 and G11).

Effect of gender and academic attribution: Male students tended (2.21 vs. 1.83; $p=0.054$) to check with others that goals were realistic on a more regular basis, while female students more often (2.71 vs. 2.35; $p=0.050$) set definite deadlines for goal accomplishment. In general, however, there were no significant effects of

Table 1. Self-reported goal-setting behavior frequency means, ordered from highest to lowest¹.

Goal-setting behavior	Mean (SD)
G8. I set goals that I think I have a good chance of achieving	3.24 (0.59)
G4. I set goals that go beyond what I have already achieved	3.19 (0.74)
G5. I set goals that present me with a challenge	3.18 (0.71)
G10. I am able to clearly distinguish my academic goals from one another	3.09 (0.75)
G3. I set clear goals that I can describe without difficulty	3.06 (0.73)
G1. When doing my academic work, I always set goals to guide my efforts	2.99 (0.75)
G12. I make sure that the numbers of goals I set for myself is manageable	2.92 (0.74)
G13. I organize my goals so that attaining one makes it easy to attain another	2.86 (0.80)
G7. I give myself plenty of time to achieve the goals I set for myself	2.80 (0.72)
G14. I set a definite deadline (date, time) for reaching each goal	2.67 (0.94)
G2. I check with others that the goals I set for myself are realistic	2.14 (0.90)
G11. I check with others that my goals involve objectives I have not yet attained	2.06 (0.89)
G6. I check with others that the goals I set for myself are clear	2.05 (0.88)
G9. I check with others that I give myself enough time to work on my goals	1.98 (0.82)

¹Responses scored on a Likert scale (1=never; 2=sometimes; 3=frequently; 4=all the time)

gender on frequency of goal-setting behaviors. Academic attribution of students did not appear to influence frequency of goal-setting strategies ($p>0.114$).

Effect of class standing: Class standing had a significant effect on most of the reported goal-setting strategies (Figure 1), with higher numerical means for juniors. Relative to freshman, juniors reported they set goals that presented them with a challenge (G5, $p=0.001$) and went beyond what they had already achieved (G4, $p=0.020$), set clear goals they can describe without difficulty (G3, $p=0.006$) and set definite deadlines for goal achievement (G14, $p=0.001$) to a higher degree, with no difference in means between freshman and sophomores ($p>0.160$) or between sophomores and juniors ($p>0.061$). Juniors were more frequent in distinguishing academic goals (G10, $p<0.038$), organizing goals so that attaining one makes it easier to attain another (G13, $p<0.015$) and making sure the number of goals set is manageable (G12, $p<0.035$) than either freshman or sophomores. Freshman reported setting goals for their academic work less frequently than either sophomores ($p=0.038$) or juniors ($p=0.001$), with no difference observed ($p=0.461$) between means for juniors and sophomores.

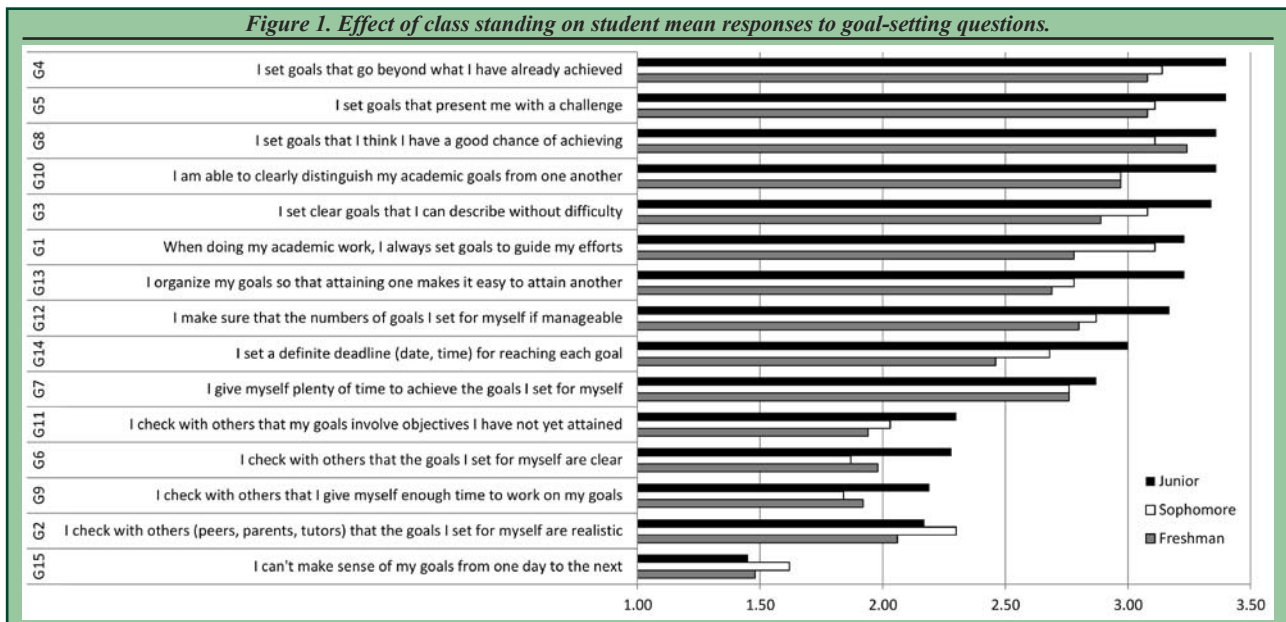
The benefits of goal-setting on student performance are widely known among educators (Boekaerts, 2002; Schunk, 2003) and it is accepted that goals designed and evaluated by students foster autonomous learning (Moeller et al., 2012). Despite this, research indicates most students are not explicitly instructed in goal-setting strategies (Bishop, 2003). Often, learning objectives or outcomes are designated solely by the instructor and rarely involve student input or encourage students to adapt such goals to their own personal interests and needs (Moeller et al., 2012) Results from this study indicate first-year students set academic goals less frequently and

were less organized, reflective and strategic in their goal-setting. From these data, it appears that students acquire “on-the-job” training to enhance goal-setting skills in the time between freshman and junior years, although the data do not account for student attrition, which may be high in first-year students. Further, it appears there is opportunity for explicit instruction in goal-setting for incoming undergraduate students and indeed, student’s at all academic levels. Learning goals set by the student and approved by the educator can capitalize on intrinsic motivation and allow students to better understand they are not just completing an assignment but also advancing toward their own career aspirations (Boekaerts, 2002; Moeller et al., 2012)

Resiliency

Resiliency means are shown in Table 2. Scores were highest for student determination (R7), pride in accomplishment (R3), general humor (R10) and life meaning (R13). In general, students reported lowest scores for their ability to handle many things at a time (R6), belief in themselves during hard times (R11), whether they usually take things in stride (R4) and ability to view situations from multiple perspectives (R12).

Effect of gender and academic attribution. Male students had higher resiliency scores for reported ability to manage one way or the other (R2, $p=0.051$), taking things in stride (R4, $p=0.025$), being friends with oneself (R5, $p=0.008$) and belief in oneself (R11, $p=0.038$). On the other hand, female students were more determined (R7, $p=0.005$) and tended to report more pride in self accomplishment (R3, $p=0.066$). These results are consistent with previous findings that males are more likely to attribute success to inherent ability, while female students generally tend to believe success is a



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Table 2. Self-reported resiliency means, ordered from highest to lowest².

Resiliency item	Mean (SD)
R7. I am determined	6.58 (0.71)
R3. I feel proud that I have accomplished things in my life	6.56 (0.72)
R10. I can usually find something to laugh about	6.46 (0.89)
R13. My life has meaning	6.45 (0.89)
R8. I have self-discipline	6.14 (1.09)
R14. When I am in a difficult situation, I can usually find my way out of it	6.11 (1.15)
R2. I usually manage one way or the other	6.07 (0.92)
R9. I keep interested in things	6.03 (0.99)
R15. I have enough energy to do what I have to do	5.90 (1.15)
R5. I am friends with myself	5.88 (1.21)
R1. When I make plans I follow through with them	5.86 (0.92)
R12. I can usually look at a situation in a number of ways	5.79 (1.17)
R4. I usually take things in stride	5.79 (1.13)
R11. My belief in myself gets me through hard times	5.63 (1.44)
R6. I feel that I can handle many things at a time	5.58 (1.21)
Average score	6.06 (0.64)

²Responses scored on a Likert scale (1=strongly disagree; 7=strongly agree)¹
 Responses scored on a Likert scale (1=never; 2=sometimes; 3=frequently; 4=all the time)

result of effort expended (Ames, 1992). In a previous study of 107 students enrolled in an introductory agricultural economics class (Splan et al., 2011b), male students scored themselves higher for R4 ($p=0.05$) than female students, but no other differences due to gender were observed. Effects of gender on resiliency scores have been mixed in the literature (Niell and Dias, 2001). Interestingly, students who attributed academic success to external factors were more likely to report that they take things in stride (R4, $p=0.005$) and say they can handle many things at a time (R6, $p=0.020$). Often we associate increased resilience and autonomous learning with a heightened internal locus of control (Fazey and Fazey, 2001; Kobasa, 1982). Results from this study indicate that students who let go of this internal locus of control may have an advantage in some aspects of resiliency, in essence allowing them to ‘roll with the punches.’

Effect of class standing. Similar to results reported for goal-setting, juniors had the highest numerical means for all resiliency items (Figure 2). Junior students were significantly higher than underclassmen for R6 ($p<0.044$), R14 ($p<0.029$) and overall average score ($p<0.015$), with no difference between freshman and sophomore means. In some cases (R1, R3, R4, R8), mean responses for juniors were significantly higher than those for freshman ($p<0.044$), but only tended to be different than those of sophomores ($p=0.053$ to $p=0.155$). Freshmen students were significantly lower than either sophomores ($p=0.018$) or juniors ($p<0.001$) in their reported ability to take things in stride (R2), while sophomores responded with less agreement than freshmen ($p=0.149$) or juniors ($p=0.023$) when asked if they believed their life had meaning.

Student attrition rates can be as high as 80% at some colleges and universities. Most student retention loss occurs in the first two years, with 75% of student losses occurring after their first year on campus (Braunstein et al., 1997). In this study, freshman often had lower resiliency scores than sophomores or juniors. This may indicate improved resiliency in individual students as they progress through the curriculum, or it may simply reflect the higher inherent resiliency of those students who persist. In a previous study of freshman, resiliency has been shown to be positively correlated with persistence to degree (Donald et al., 2004) and explicit training in resiliency improved academic performance, meta-cognitive development and student persistence to degree (Harnish, 2005). Thus, the lower resiliency scores among freshmen in animal sciences reported here may represent potential opportunity for positive intervention in the discipline through explicit coaching in resiliency and other self-efficacy factors, a pedagogical method not currently employed in most agricultural education programs.

Figure 2. Effect of class standing on student mean responses to resiliency questions.

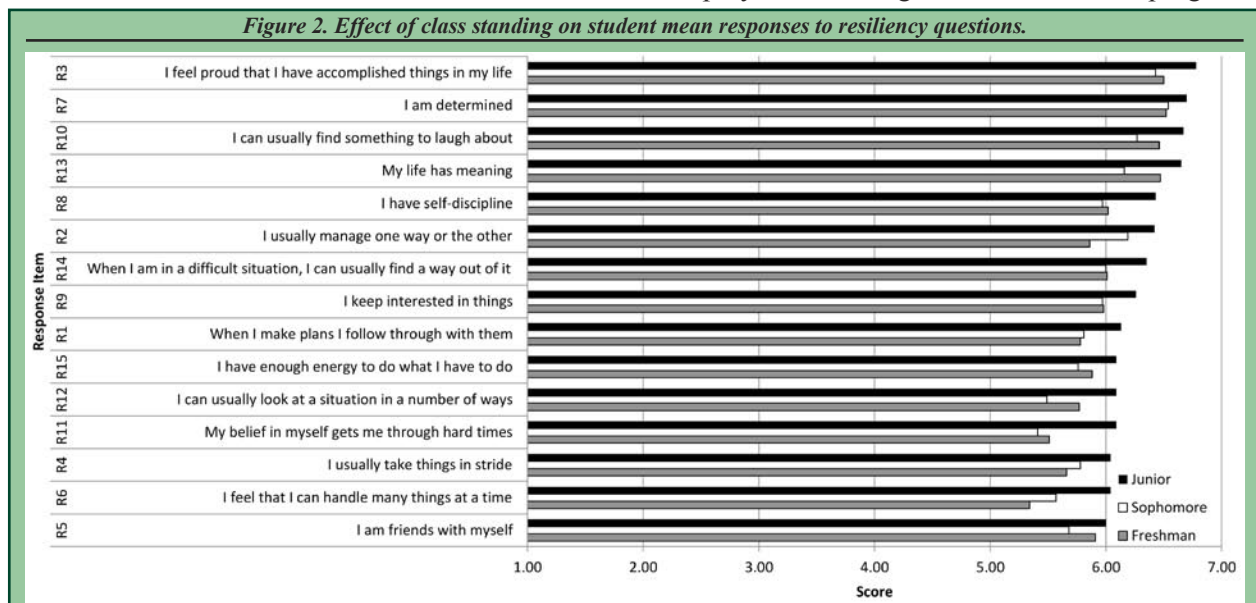


Table 3. Spearman rank correlations between goal-setting strategies and average resiliency, ordered from highest to lowest

Goal-setting behavior	r
G13. I organize my goals so that attaining one makes it easy to attain another	0.33***
G3. I set clear goals that I can describe without difficulty	0.31***
G7. I give myself plenty of time to achieve the goals I set for myself	0.31***
G9. I check with others that I give myself enough time to work on my goals	0.27***
G10. I am able to clearly distinguish my academic goals from one another	0.25**
G5. I set goals that present me with a challenge	0.24**
G14. I set a definite deadline (date, time) for reaching each goal	0.23**
G8. I set goals that I think I have a good chance of achieving	0.21**
G6. I check with others that the goals I set for myself are clear	0.21*
G12. I make sure that the numbers of goals I set for myself is manageable	0.20*
G4. I set goals that go beyond what I have already achieved	0.18*
G11. I check with others that my goals involve objectives I have not yet attained	0.17*
G1. When doing my academic work, I always set goals to guide my efforts	0.12
G2. I check with others that the goals I set for myself are realistic	0.11

*p<0.05
**p<0.01
***p<0.001

Correlations Between Goal-setting Strategies and Resiliency

Correlations among and between responses to goal-setting and average resiliency scores are shown in Table 3. As expected, all values were numerically positive, indicating behaviors that facilitate goal attainment are favorably associated with adaptability and capacity for change. The largest correlations were found between average resiliency and organizing goals ($r=0.33$; $p<0.001$), goal clarity ($r=0.31$; $p<0.001$) and checking with oneself ($r=0.31$; $p<0.001$) and others ($r=0.27$; $p<0.001$) to ensure adequate time to achieve goals, indicating more resilient students were also more organized in their approach to goal-setting. This higher level of organization and self-discipline has been shown to be a general characteristic of high-performing students (Komarraju et al., 2009), who also tend to be more resilient (Harnish, 2005). Non-significant correlations were found between average resiliency and both G1 (“when doing my academic work, I always set goals to guide my efforts”) and G2 (“I check with others that the goals I set for myself are realistic”).

Summary

Although some differences due to gender and perceptions of attribution were noted in self-reported goal-setting and resiliency responses among undergraduate students enrolled in an introductory animal science course, the greatest differences appeared to be due to class standing. Upperclassmen were more generally confident in their use of goal-setting strategies and displayed more resiliency than freshman or sophomore students. Explicit resiliency training or instruction in goal-setting are not part of the current curriculum in animal science at this particular university; thus it is encouraging to observe that student scores independently increase for goal-setting behavior and resiliency as they

progress through the curriculum. This may be due to necessity on the part of the student (self-directed learning), positive peer-influences, or perhaps students’ efforts to capitalize on myriad on-campus services aimed at career preparation or improving academic performance. However, given the relatively low mean scores reported for both resiliency and goal-setting, it seems students at all academic levels could benefit from instructional intervention that improves metacognition and learner autonomy. Given the indicated relationship in the literature between these factors and student achievement (Moeller et al., 2012), further research in this area is warranted.

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