

Investigating Factors that Influence Achievement Goal Orientation and Educational Practices in Undergraduate Agricultural Sciences and Natural Resource Students

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Abstract

Goal orientation can aid in explaining/predicting behavior in academic settings. This inquiry examined undergraduate agricultural sciences and natural resource students' reasons for engaging in academic tasks at a land-grant university and determined the influence of academic efficacy, academic self-handicapping and skepticism about the relevance of school for future success on achievement goal orientation (mastery-approach, mastery-avoidance, performance-approach and performance-avoidance). Students possessed multiple reasons for engaging in academic tasks and as a result, we recommend instructors utilize immediate and long-term motivations during the teaching and learning process. Future research should investigate best practice on how to teach students with multiple goal orientations. In addition, a multivariate Tobit regression was used and parameter estimates were significant for academic efficacy and self-handicapping. Instructors should be cognizant of this and provide high-quality academic feedback to support academic efficacy, achievement motivation and skill acquisition and to reduce self-handicapping behaviors. Skepticism about the relevance of school for future success was not a significant predictor of achievement goal orientation and may not be an area of concern for instructors at the University of Tennessee. Future research should seek to determine other factors that influence achievement goal orientations and investigate educational practices that help students develop mastery goals for learning.

Introduction

Actions college and university instructors take to improve teaching and learning have an impact on the nation's future and play a critical role in preparing students

as science professionals and well informed citizens (Kober, 2014). With that in mind, the subjects of teaching and learning are complex and effective teaching and learning has benefits for all students (National Research Council, 2009). According to Schunk (2012), learning is *"an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience"* (p. 3). When learning occurs, synaptic connections are formed and strengthened (Schunk, 2012). Researchers have purported learner, teacher and environmental variables influence teaching and learning (Bandura, 1986; Bransford et al., 2000; Dunkin and Biddle, 1974; Schunk, 2012). Similarly, the National Research Council (2009) reported a one size fits all approach to instruction would not help students with different learning styles and ways of assimilating information be successful in the classroom. Thus, educators can have an impact on a student's subject matter comprehension and motivation by understanding how their students learn (Schunk, 2012).

One aspect of the teaching and learning process is learner motivation (Bransford et al., 2000; National Research Council, 2009; Schunk, 2012). Learner motivation is a cognitive process whereby goal-directed activities are instigated and sustained (Schunk, 2008). According to Mankin et al. (2004), motivation is fundamental to learning and learner motivation has continuously been an issue for educators, since students have diverse backgrounds, different learning styles, interests and experiences. McCombs (as cited in Mankin et al., 2004) argued motivation to learn comes from external supports as well as internal processes. Therefore, teacher and student characteristics interact to create an environment that promotes or hinders motivation for learning (Mankin

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et al., 2004). Motivation for learning helps explain what a student learns, how a student learns and why students behave as they do (Schunk, 2012).

One aspect of agricultural sciences and natural resource education is to understand why students engage in academic tasks and what factors influence academic motivation. Understanding this key component may help improve teaching and learning in colleges of agriculture. This is important because colleges of agriculture are tasked with educating future leaders within the realm of agricultural science and natural resources and their graduates are essential in addressing the “United States priorities of food security, sustainable energy and environmental quality” (Goecker et al., 2014, Graduates section, para. 2). Furthermore, the United States depends on agriculture and agri-businesses as drivers in economic development in rural and metropolitan communities, which influences the long-term viability of local communities (National Research Council, 2009). What is more, employment opportunities in agriculture-related fields are increasing and the current supply of postsecondary graduates is only able to fill 61% of 57,900 annual employment openings. Complicating the issues is many agricultural graduates find opportunities for employment outside the agriculture sector – leaving an even larger gap between graduates with expertise in the agricultural sciences and employment demands (Goecker et al., 2014).

Based on the role motivation plays in learning and the need to produce postsecondary graduates with expertise in agriculture, this study will examine undergraduate agricultural sciences and natural resource students’ reasons for engaging in academic tasks and factors that influence their academic motivation at the University of Tennessee. This information can be used to improve the teaching and learning experiences of agricultural sciences and natural resource students.

Theoretical Framework/Review of Literature

The theoretical framework for this study was goal theory, which was developed by educational and developmental psychologists to explain and predict the achievement behaviors of students (Schunk, 2012). “Goal theory postulates that important relationships exist among goals, expectations, attributions, conceptions of ability, motivation orientations, social and self-comparisons, and achievement behaviors” (Schunk, 2012, p. 374). Fundamental to goal theory is how different types of goals influence behavior and these types are known as goal orientations (Schunk, 2012). Goal orientation denotes the “purpose and focus of an individual’s engagement in achievement activities” (Schunk, 2012, p. 374). Furthermore, achievement goal orientations are known to influence self-regulatory efforts related to learning (Ormrod, 2012; Schunk, 2012; Zimmerman and Cleary, 2009).

For this study, four types of achievement goal orientations were considered: “mastery-approach (focused

on attaining task-based or intrapersonal competence), performance-approach (focused on attaining normative competence), mastery-avoidance (focused on avoiding task-based or intrapersonal incompetence) and performance-avoidance (focused on avoiding normative incompetence)” (Elliot and Murayama, 2008, p. 614). These orientations provide information on intrinsic motivation and performance attainment (Elliot and Murayama, 2008). Additionally, achievement goal orientations may not be mutually exclusive and students could possess them simultaneously (Daniels et al., 2008; Hidi and Harackiewicz, 2000; Ormrod, 2012).

Mastery Goals

Mastery goals can be described as developing ability, understanding the material, learning and improving skills (Ciani et al., 2010). Mastery goals can have two orientations: (a) mastery-approach and (b) mastery-avoidance (Senko et al., 2013). Mastery-approach and -avoidance goals arise when students perceive the class as engaging and interesting (Elliot and McGregor, 2001). Goal theory suggests mastery-approach goals are most adaptive and should be equal to or greater than that of the achievements and benefits from both performance goals (Senko et al., 2013). Belenky and Nokes-Malach (2012) posited mastery-approach goals may aid transfer by enabling cognitive processes that connect learning experiences. Mastery-avoidance goals have more negative antecedent than mastery-approach (Elliot and McGregor, 2001). Early research suggests mastery-avoidance has a negative effect on emotional factors related to learning (Schunk, 2012). Though, research on the effects of the two orientations considered separately is limited (Ormrod, 2012).

On the other hand, a more developed body of research suggests mastery goals are preferred to performance goals (Ormrod, 2012) and lead to positive effects on learning (Schunk, 2012). To that end, numerous outcomes are derived from mastery goals: (a) motivation, (b) persistence, (c) interest, (d) study strategies and (e) seeking out help (Ciani et al., 2010). Similarly, Ames and Archer (1988) and Nolen (1988, 1996) found mastery goals influence students use of effective learning strategies and deep process strategies that improve understanding. Senko and Miles (2008) suggested mastery goals promote high achievement and students with mastery oriented goals are the students who study material at a great depth, go above and beyond what the teacher is expecting as well as explore topics that are related to the course. Empirical evidence suggests mastery goal orientation promotes a motivational pattern that is likely to promote long-term and high-quality involvement in learning (Ames, 1992).

Performance Goals

According to Senko and Miles (2008), performance approach goals are unrelated to the benefits of mastery goals; those being high course interest and deep learning strategies. Performance goals define success

as outperforming peers with normative standards (Senko et al., 2013). With performance-approach goals, students focus on outperforming their peers and with performance-avoidance goals, students are trying to avoid poor performance compared to their peers. Senko et al. (2013) posited performance-approach goals aid achievement more for challenging rather than simple tasks. Performance goals can be negatively affected if the goals set are unreachable due to an obstacle and less than adequate performance to overcome that obstacle (Stout and Dasgupta, 2013). Additionally, performance goals can help mastery oriented students remain on task and perform well (Harackiewicz et al., 1997). *"The strength of aroused motivation to achieve as manifested in performance has been viewed as a function of both the strength of motive and the expectancy of goal-attainment aroused by situation cues"* (Atkinson, 1957, p. 359). Luo et al. (2011) stated under some circumstances performance goals are appropriate and can lead to high achievement.

Performance-approach and -avoidance goals are so closely related they may be activated simultaneously in the classroom (Law et al., 2012). This suggests a student could potentially have performance-approach goals as well as performance-avoidance at the same time in the classroom setting (Law et al., 2012). Elliot and Church (1997) found performance-avoidance was associated with fear of failure and low competence expectancies, whereas performance-approach was associated with achievement motivation, fear of failure and high competence expectancies.

Academic Self-Efficacy

How a student views their ability to complete a skill or task is known as their self-efficacy (Pintrich and Zusho, 2007). Pintrich and Zusho (2007) stated college students who have higher self-efficacy are more likely to be metacognitive; they will try to regulate their learning by controlling their cognition as the learning occurs. Furthermore, self-efficacy beliefs are positively related to adaptive and self-regulatory strategy use as well as to actual achievement in the college classroom (Pintrich and Zusho, 2007). Likewise, Pintrich (1999) purported students who believed they could learn were confident in their skills and more likely to report the use of self-regulatory strategies. Students can use self-efficacy as a personal resource when performing tasks associated with academic and self-regulated learning (Pintrich, 1999). Students' choice of activities can be influenced by self-efficacy (Bandura, 1977; Schunk, 2012).

Students with low self-efficacy for learning may avoid attempting tasks; those who judge themselves efficacious should participate more eagerly. Self-efficacy also can affect effort expenditures, persistence and learning. Students who felt efficacious about learning generally expend greater effort and persist longer than students who doubt their capabilities, especially when they encounter difficulties (Schunk, 2012, p. 147).

To that end, possessing the required knowledge and skills to perform a behavior may not be enough for students (Artino, 2012). According to Artino (2012), self-efficacy may be the motivating factor in academic choices rather than their competence. Similarly, Bandura (1977) posited self-efficacy can direct choice of activities and settings and influence coping efforts during a task through expectation of success. Thus, when self-efficacy is strong, coping efforts will be used more effectively (Bandura, 1977). Additionally, academic self-efficacy has been shown to positively influence socio-cognitive processes and is a robust predictor of academic performance in undergraduate students (Putwain et al, 2013).

Self-Handicapping

Self-handicapping is any action or choice of performance setting that enhances the opportunity to externalize failure and internalize success (Berglas and Jones, 1978). Examples of self-handicapping are procrastination (Pintrich and Zusho, 2007), not getting enough sleep or being unprepared for an examination, exaggerating the effects of illness or injury, as well as embracing impediments and plausible performance handicaps (Berglas and Jones, 1978). Berglas and Jones stated *"any use of self-handicapping that involves more than cognitive distortion presumably decreases the chances for success"* (p. 406).

Generally, self-handicappers are not looking to fail but are willing to accept failure if failing can be explained in an effort to preserve their self-esteem or conception of ability (Berglas and Jones, 1978; McCrea, 2008). Self-handicapping can lead to not achieving fully academically and prompt frustration among parents and teachers (Urduan, 2004). Gadbois and Sturgeon (2011) suggested poor prior performance would relate to future propensities to self-handicap within the student's future academic performance. When students fail, the obstacle at hand gives them the opportunity to transfer credit of the failure from their ability to the handicap (Schwinger et al., 2014). Self-handicappers also tend to display an uncertainty of their competence (Zuckerman and Tsai, 2005).

"Both denial and disengagement imply a tendency to turn away from a difficult reality in order to sustain an illusion of something better. Turning away from a difficult reality and constructing a situation more supportive of one's self-concept are core elements in self-handicapping strategies" (Zuckerman and Tsai, 2005, pp.414-415).

In contrast, *"people who know they have the talent and resources to master life's challenges are not likely to hide behind that attributional shield of self-handicapping"* (Berglas and Jones, 1978, p. 406). The behavior of self-handicapping occurs more frequently when value or importance increases (McCrea, 2008). Some disadvantages of self-handicapping are burnout (Akin, 2012) and lower health and well-being, competence satisfaction and intrinsic motivation (Zuckerman and Tsai, 2005). More specifically to teaching and learning, hand-

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icapping behaviors are purported to inhibit deep and successful learning (Schwinger et al., 2014). Academic self-handicapping strategies have been associated with classroom goals, self-perception and learning strategies (Gadbois and Sturgeon, 2011). Gadbois and Sturgeon (2011) found academic self-handicapping had a negative relationship with self-regulated learning strategies, deep learning, intrinsic value of learning, self-concept clarity and academic self-efficacy.

Relevance of School

Perception of a task or activity can influence a student's approach to learning and can have consequences in their use of time to complete a task or activity (Ames, 1992; Good, 1983). Pintrich and Zusho (2007) stated learners have perceptions of the value and interest the task or content area has for them. *"Perceptions of the college classroom norms and classroom climate are important aspects of college students' knowledge activation of contextual information"* (Pintrich and Zusho, 2007, p.762) and perception of learning may be the catalysts for future learning (Picciano, 2002). The importance of the task and the task's value is related to the perception of the individual performing the task and the task's importance to the individual (Pintrich and Zusho, 2007). Pintrich and Zusho (2007) argued a student's perception determines the utility value, which would include the relevance of the coursework in some immediate way or how it will help them in life, in general, or their career.

To that end, Voelkl (1996) professed a major problem with United States youth were their emotional and physical withdrawal from school due to the belief that school did not meet their life needs. More recently, Humphreys and Davenport (2005) found students perceived some aspects of the college curricula (i.e., service learning) distracted from their self-development (maturity, time management skills, work habits, self-discipline and teamwork skills). Furthermore, Humphreys and Davenport found college students thought the general education requirements were a distraction from their major coursework and were not pleased with the options the colleges were offering to meet their needs in those areas.

Belongingness also impacts a student's perception of school (Voelkl, 1996). *"Belongingness is represented by feelings that one is a significant member of the social community, is accepted and respected in school, has a sense of inclusion in school, and includes school as part of one's self-definition"* (Voelkl, 1996, p. 762). Osterman (2000) suggested belonging is an important component in understanding student behavior and performance. According to Voelkl (1996), students who do not identify with school are the students who are less successful and show negative learning behaviors (i.e., low levels of classroom participation, low levels of involvement in academic activities, lowered academic motivation and attention, skipping class and being disruptive). Osterman (2000) found the experience of belongingness was important at all ages and all grade levels. Osterman also

stated little evidence shows sense of belonging being directly related to achievement, but considerable evidence suggests sense of belonging influences achievement through the effects on engagement. Addressing needs related to belonging should aid in improving motivation, behavior and learning (Osterman, 2000).

With that in mind, *"students' feelings of identification and participation in classroom activities may be part of a cycle that promotes or detracts from academic achievement"* (Voelkl, 1996, p. 761). For students to engage in their education, they must value the experience of learning regardless of their interest in the topics or activities at hand (Deci et al., 1991). Long term, a college education generally has a positive indirect effect on job satisfaction via influences such as job prestige, income, job autonomy and non-routine work (Pascarella and Terenzini, 2005). College major may affect job satisfaction, which could be mediated by working in the field studied and income (Wolniak and Pascarella, 2005). Students select a major field of study with the anticipation that upon graduation they will work in that field (Robst, 2007). Wolniak and Pascarella (2005) stated those who *"majored in a high income field or perceived their job to be related to their major had significantly greater job satisfaction indirectly by way of income"* (p. 243). In contrast, some students place little value on their college education, though a majority believe the college experience to be of value (Humphreys and Davenport, 2005).

Purpose and Objectives

The purpose of this study was to examine undergraduate agricultural sciences and natural resource students' reasons for engaging in academic tasks at a land-grant university. The following objectives framed the research reported here:

1. Describe the goal orientations of undergraduate students in the College of Agricultural Sciences and Natural Resources at the University of Tennessee.
2. Determine the influence of academic efficacy, academic self-handicapping and skepticism about the relevance of school for future success on achievement goal orientation.

Methodology

Research Design, Population and Sample

This study was part of a larger study investigating undergraduate student motivation, metacognition and engagement in academic tasks. The research design was descriptive survey research. The target population of this study was all undergraduate students (N=1,286) in the College of Agricultural Sciences and Natural Resources at the University of Tennessee. The sample was a convenience sample of 303 undergraduate students or 24% of the target population. The sample consisted of 88 males and 215 females. The average age of the sample was 21.6 years old ($M=21.6$, $SD=4.73$) with a range of 18-49 years old. The class level of the

sample was 20% freshman, 18% sophomores, 28% juniors and 34% seniors. The mean grade point average of these students was 3.28 ($SD=0.68$) on a four-point scale. Participants described their ethnicity as: 1% American Indian or Alaskan Native, 1% as Asian, 7% as Black or African American, 1% as Native Hawaiian or Other Pacific Islander, 87% as White and 3% as Spanish/Hispanic/Latino. The sample was compared to the known demographic variables of ethnicity, class level, major and gender and was found to be representative based on ethnicity, class level and major. However, the sample was skewed towards females and was weighted based on the population parameter.

Instrumentation

The researcher-developed questionnaire consisted of five sections: (a) six demographic questions, the 12 item Achievement Goal Questionnaire (Elliot and Murayama, 2008), the five item Academic Efficacy Scale (Midgley et al., 2000), the six item Academic Self-handicapping Strategies Scale (Midgley et al., 2000), the six item Skepticism About the Relevance of School for Future Success Scale (Midgley et al., 2000) and 24 survey questions not reported on in this article. Minor wording changes were made to the Achievement Goal Questionnaire, Academic Efficacy Scale and Academic Self-handicapping Strategies Scale to fit the context of the study. For example, "I'm certain I can master the skills taught in class this year" was changed to "I'm certain I can master the skills taught in my classes this year" and "Even if I do well in school, it will not help me have the kind of life I want when I grow up" was changed to "Even if I do well in school, it will not help me have the kind of career I want when I graduate." We modified the wording to include all classes taken by the students and focus on their desired career after graduation instead of life.

The Achievement Goal Questionnaire consisted of four constructs and Elliot and Murayama (2008) reported Cronbach's alpha coefficient of 0.84 for the mastery-approach, 0.88 for the mastery-avoidance, 0.92 for the performance-approach and 0.94 for the performance-avoidance. Elliot and Murayama also reported structural validity of the four constructs was assessed using confirmatory factor analytic techniques and the structural validity was confirmed. Midgley et al. (2000) reported Cronbach's alpha coefficients for academic efficacy as 0.78, 0.84 for the academic self-handicapping strategies and 0.83 for skepticism about the relevance of school for future success. The post-hoc reliabilities for each construct were: 0.91 for academic efficacy, 0.87 for self-handicapping, 0.88 for skepticism, 0.81 for mastery-approach, 0.74 for master-avoidance, 0.81 for performance-approach and 0.83 for performance-avoidance. The Achievement Goal Questionnaire utilized a rating scale for each construct of 1 = strongly disagree to 5 = strongly agree. The scales from Midgley et al. used a different rating scale: 1 = not at all true to 5 = very true. Six cognitive interviews were conducted with individuals of the target population and they were not included

in the study. Dillman et al. (2009) recommended conducting cognitive interviews to identify wording, design and navigation issues. Based on the cognitive interviews, changes were made to survey directions and to questions which were part of the larger study to improve clarity, flow and understanding of the questionnaire.

Data Collection

Data for this study were collected during the fall semester at the University of Tennessee using the online Qualtrics Survey software. The questionnaire was sent electronically to the undergraduate students using their university email accounts. Dillman et al.'s (2009) procedures for implementing web surveys guided the multiple contacts made. Four emails were sent through the Qualtrics Survey software approximately one week apart to all College of Agricultural Sciences and Natural Resources students. The first email was sent to inform the entire population of the study. The second email contained the link to the survey and the online informed consent. If the students chose to participate in the study, they digitally signed the informed consent by clicking, they voluntarily agree to participate in the study and I have read the informed consent. The third and fourth emails were sent as a reminder to the students of the opportunity to participate in the study and both contained the link to the survey. The survey took approximately 10-15 minutes to complete and this research was approved by the University of Tennessee's Institutional Review Board.

Data Analysis

Descriptive statistics were used to summarize demographic information. Summated means were calculated for the following constructs: (a) mastery-approach, (b) mastery-avoidance, (c) performance-approach, (d) performance-avoidance, (e) academic efficacy, (f) academic self-handicapping strategies and (g) skepticism about the relevance of school for future success. A multivariate Tobit regression was used to determine if academic efficacy, academic self-handicapping and skepticism about the relevance of school for future success could predict achievement goal orientation. The Tobit model restricts the dependent variable to always be greater than zero and the multivariate estimation considers the correlation of the unexplained factors captured in the error term that impact the achievement goal orientation (Greene, 2008).

Methodological Limitations

The findings of this study may not be generalizable beyond the target population – undergraduate students in the College of Agricultural Sciences and Natural Resources at the University of Tennessee. Therefore, readers should use caution when generalizing the results of this study unless data confirms the target population of this study is representative of other populations of undergraduate students.

Results

Objective 1: Describe the goal orientations of undergraduate students in the College of Agricultural Sciences and Natural Resources at the University of Tennessee.

As shown in Table 1, the summated means for mastery-approach, mastery-avoidance, performance-approach and performance-avoidance were 4.42 (*SD*=0.03), 3.79 (*SD*=0.05), 4.18 (*SD*=0.05) and 4.07 (*SD*=0.05), respectively. Students' highest goal orientation was mastery-approach and lowest was mastery-avoidance, which indicates students are least concerned with avoiding task-based or intrapersonal incompetence. In regard to performance, students' goal orientations are similar. Overall, the small range in mastery and performance goal orientations (3.79 to 4.42) indicates the students are focused on achieving and avoiding personal and normative competence and incompetence. This is further supported by majority agreement on all items of the Achievement Goal Questionnaire (Elliot and Murayama, 2008; Table 2).

Objective 2: Determine the influence of academic efficacy, academic self-handicapping and skepticism about the relevance of school for future success on achievement goal orientation.

Parameter estimates for academic efficacy were positive and significantly predicted mastery-approach ($\beta_{AE}=0.36, p<0.05$), mastery-avoidance ($\beta_{AE}=0.27, p<0.05$) and performance-approach ($\beta_{AE}=0.29, p<0.05$). Academic efficacy did not significantly predict performance-avoidance ($\beta_{AE}=0.05, p>0.05$). Parameter estimates for self-handicapping were negative and significantly predicted

mastery-approach ($\beta_{SH} = -0.18; p<0.05$), mastery-avoidance ($\beta_{SH} = -0.22, p<0.05$), performance-approach ($\beta_{SH} = -0.19, p <0.05$) and performance-avoidance ($\beta_{SH} = -0.23, p <0.05$). Parameter estimates for skepticism were negative and did not significantly predict ($p>0.05$) the achievement goal orientations (Table 3). The error terms for each of the achievement goal orientations were significantly correlated, suggesting that unexplained factors that impact the achievement goal orientations were positively correlated and that the multivariate Tobit model is appropriate.

Summary, Discussion and Recommendations

This study sought to describe the achievement goal orientation of undergraduate College of Agricultural Sciences and Natural Resources students at University of Tennessee and determine the influence of academic efficacy, academic self-handicapping and skepticism about the relevance of school for future success. Overall, the undergraduate students possessed multiple reasons for engaging in academic tasks as indicated by the majority agreement on all items representing the four achievement goal orientations and the summated achievement goal orientation means. Thus, the undergraduate agricultural sciences and natural resource students use intrapersonal and social comparisons to attain competence or avoid incompetence

Table 1. Summary Statistic of Achievement Goal Orientations

Goal Orientation	M	SD
Mastery-Approach	4.42	0.03
Mastery-Avoidance	3.79	0.05
Performance-Approach	4.18	0.05
Performance-Avoidance	4.07	0.05

Note. 1 = strongly disagree to 5 = strongly agree.

Table 3. Summary of Parameter Estimates for Academic Efficacy, Academic Self-handicapping, and Skepticism about the Relevance of School for Future Success as Predictors of Achievement Goal Orientation

Parameter Estimates	Mastery-Approach	Mastery-Avoidance	Performance-Approach	Performance-Avoidance
Intercept	3.56***	3.23***	3.74***	4.65***
Academic Efficacy	0.36***	0.27***	0.29***	0.05
Self-Handicapping	-0.18**	-0.22*	-0.19*	-0.23*
Skepticism	-0.07	-0.02	-0.13	-0.09
Sigma	0.68***	1.07***	0.96***	1.18***

Correlation Estimates

Mastery-Approach	-	0.40***	0.42***	0.32***
Mastery-Avoidance	0.41***	-	0.30***	0.54***
Performance-Approach	0.42***	0.30***	-	0.72***
Performance-Avoidance	0.32***	0.54***	0.72***	-

Note. *p<.05, **p<.01, ***p<.001.

Table 2. Descriptive Statistics for Goal Orientation Items

Items	Strongly Disagree %	Disagree %	Neither Agree nor Disagree %	Agree %	Strongly Agree %
Mastery-Approach					
My aim is to completely master the material presented in my coursework.	1.00	2.00	4.67	50.00	42.33
I am striving to understand the content in my coursework as thoroughly as possible.	1.34	1.34	3.68	44.82	48.83
My goal is to learn as much as possible.	0.34	1.68	3.02	34.90	60.07
Mastery Avoidance					
My aim is to avoid learning less than I possibly could.	9.48	10.35	17.50	35.49	27.17
I am striving to avoid an incomplete understanding of the course material.	3.09	2.65	7.11	48.00	39.14
My goal is to avoid learning less than it is possible to learn.	7.94	9.82	21.13	38.00	23.10
Performance-Approach					
My aim is to perform well relative to other students	9.48	10.35	17.50	35.49	27.17
I am striving to do well compared to other students.	3.09	2.65	7.11	48.00	39.14
My goal is to perform better than the other students.	3.00	6.36	20.12	31.50	39.03
Performance-Avoidance					
My aim is to avoid doing worse than other students.	2.99	5.26	17.05	37.54	37.18
I am striving to avoid performing worse than others.	2.64	4.91	17.25	39.48	35.72
My goal is to avoid performing poorly compared to others.	3.28	5.28	9.48	33.42	48.54

while self-regulating their learning. This finding is consistent with Daniels et al. (2008), Hidi and Harackiewicz (2000), Law et al. (2012) and Ormrod (2012). However, the students were more oriented toward mastery-approach and least oriented toward mastery-avoidance. This suggests the undergraduate students were more concerned with attaining task-based or intrapersonal competence than avoiding task-based or intrapersonal incompetence. Furthermore, the students possessed similar orientations regarding performance-approach and performance-avoidance, which is consistent with Law et al. (2012). This suggests students were nearly equally motivated to attain normative competence and avoid normative incompetence. This may indicate that the undergraduate agricultural sciences and natural resource students at the University of Tennessee were concerned with immediate and long-term motivations for learning such as grades and career proficiency. We recommend instructors utilize immediate and long-term motivations during the teaching and learning process. Based on the finding that the undergraduate students possessed all the achievement goal orientations, explicitly connecting course content, assignments and tasks to prior knowledge, assessments and learning experiences and to future use should support the students' immediate and long-term learning and performance goals. Theoretically, this ought to positively influence what and how students learn (Ormrod, 2012; Schunk, 2012). Future research should investigate best practice on how to teach students with multiple goal orientations. This may be particularly important in colleges of agriculture where most students are in pre-professional majors like the College of Agricultural Sciences and Natural Resources at the University of Tennessee. These students may possess multiple goal orientations due to the pressure to master the content and outperform their peers. Future research should also seek to determine if students in non-pre-professional majors exhibit fewer goal orientations. This study did not distinguish between the pre-professional and non-pre-professional students and this could also have implications on how courses should be taught based upon students' motivations for engaging in academic tasks. In addition, utilizing cooperative learning techniques may reduce competition and focus students' efforts on mastery learning (Schunk, 2012). For that reason, future research should explore the effects of cooperative learning on social/normative comparisons.

Academic efficacy had a positive impact and was a significant predictor of mastery-approach, mastery-avoidance and performance-approach orientations but was not a significant predictor of performance-avoidance. Consistent with goal theory (Schunk, 2012), academic efficacy had a direct relationship with the achievement goal orientations. Instructors should be cognizant of this and that self-efficacy mediates achievement gains (Putwain et al., 2013; Schunk, 2012). As a result, instructors should judiciously provide academic feedback that supports achievement motivation and

skill acquisition. This feedback can encourage self-regulation (Ormrod, 2012; Schunk, 2012; Zimmerman and Cleary, 2009) and aid the learner in sustaining motivation for learning and for tasks associated with teaching and learning (Ormrod, 2012; Schunk, 2012; Schunk and Swartz, 1993a, 1993b). Instructors should also keep in mind that learning success should positively impact academic efficacy and thus, students are likely to put forth more effort, persist when presented with challenging learning related task, engage in effective learning strategies and develop intrinsic motivation for learning (Bandura, 1986; Ormrod, 2012; Schunk, 2012). Therefore, we recommend instructors scaffold complex tasks or skills to allow students opportunities to build or support their academic efficacy and to make and gauge progress in knowledge and skill acquisition. To accomplish this, instructors will need to thoroughly vet their assignments and educational tasks against course objectives and desired learning outcomes.

Self-handicapping had a negative effect and was a significant predictor of all four achievement goal orientations. Thus, self-handicapping had an inverse relationship with the achievement goal orientations. Providing high-quality feedback may also be important for students who tend to self-handicap, since self-handicappers tend to display uncertainty in their ability (Zuckerman and Tsai, 2005). High-quality feedback may aid self-handicappers in properly evaluating their present level of mastery and performance and encourage mastery goal setting. This is relevant because students who exhibit mastery goal orientations generally engage in activities that aid in knowledge and skill acquisition (Ames and Archer, 1988; Nolen, 1988, 1996; Ormrod, 2012; Schunk, 2012). Also, to help prevent underachievement, instructors may want to design assignments that build upon each other, when appropriate and are worth a smaller percentage of points in relation to overall possible points for a course as self-handicapping is more frequent when value or importance increases (McCrea, 2008). However, the knowledge base regarding how instructors positively or negatively influence self-handicapping is sparse. Thus, future research is warranted and should seek to reduce the behavior. Future research should consider learner, teacher and environmental variables (Bandura, 1986; Bransford et al., 2000; Dunkin and Biddle, 1974; Schunk, 2012) and their influence on self-handicapping.

Skepticism about the relevance of school for future success had a negative effect but was not a significant predictor of the achievement goal orientations. Therefore, for undergraduate students in the College of Agricultural Sciences and Natural Resources at the University of Tennessee, skepticism about the relevance of school for future success did not explain a significant portion of the variance in the achievement goal orientations. The negative effect is to be expected given the fact relevance of subject matter influences students' approaches to learning (Ames, 1992; Good, 1983), perceptions of career readiness and self-develop-

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ment (Humphreys and Danenport, 2005; Voelkl, 1996) and theoretically course expectations and reasons for engaging in academic tasks (Schunk, 2012). However, the results of this study suggest, the effect of skepticism about the relevance of school for future success may not be an area of concern for instructors at the University of Tennessee.

In summary, instructors in the College of Agricultural Sciences and Natural Resources at the University of Tennessee should focus more attention to supporting/improving academic efficacy and reducing self-handicapping behaviors than skepticism about the relevance of school for future success. Additionally, based on the results of this study, we recommend administrators provide professional development opportunities or opportunities for instructors to attend professional development on academic efficacy and self-handicapping. Moreover, we recommend this study be replicated in other colleges of agriculture to see if those populations of undergraduate students possess similar goal orientations and explanatory factors. Future research should also seek to determine other explanatory factors that influence achievement goal orientations and investigate instructional strategies and educational practices that help students to develop mastery goals for learning. This information can be used to improve undergraduate instruction and may prove to be a critical component as we strive to prepare students to be science professionals and well informed citizens.

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