Examining Undergraduate Student Attitude towards Interdisciplinary Education

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Abstract

As the global population grows, concern for a food shortage may be looming. As the next generations of agricultural and natural resource leaders are prepared to address this challenge, input throughout multiple disciplines is required to solve this dilemma. Undergraduates must be prepared to engage in problem solving and entrepreneurial thinking if our society hopes to conquer this shortage. Opportunities to engage in interdisciplinary education can offer learning experiences focused on bridging research and policy, exploring real world problems, and developing solutions for socio-environmental issues. As interdisciplinary education in academia gains momentum, exploration is needed to understand the factors and influences affecting student attitude towards enrollment in interdisciplinary courses. This research examined the relationships between undergraduate goal orientation and attitude towards participation in interdisciplinary education specifically addressing, "How do we sustainably feed nine billion people by 2050?" Data was collected from a convenience sample of undergraduates who responded to Vandewalle's (1997) goal orientation and a researcher-developed instrument. Findings indicated undergraduates were most interested in nutrition followed by human disease management and water issues and least interested in economic concerns and plant disease management issues. Learning goal orientation and performance goal orientation – prove were found to influence attitude toward interdisciplinary education.

Keywords: interdisciplinary education, goal orientation, sustainability, food security

Introduction/Review of Literature

The global population rose above seven billion individuals at the beginning of 2012 with an expected population of 9.3 billion by 2050 (FAO, 2011) initiating a question resonating around the world: How will we sustainably feed nine billion people? Experts around the world are warning that a global food shortage may be looming, creating an environment ripe for discussions around food security. Food security is a flexible concept, as the definition has been altered and adjusted several times since it was first defined at the 1974 World Food Summit. *The State of Food*

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Insecurity 2003 (FAO, 2003) defined food security as "a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (p. 3). To assure food security for all people, conscious efforts amongst several disciplines will be required to address 21st century challenges.

Recommendations from the National Research Council (2009) include engaging students in a variety of experiences, establishing and supporting joint programs that are relevant to agriculture to assist students interested in pursuing agricultural careers, and developing partnerships with industry professionals to provide opportunities for students to work in non-academic settings. Engaging undergraduate students in meaningful learning experiences through interdisciplinary education could provide occasions to support the recommendation of the National Research Council (2009), while immersing them in situations where they learn how to communicate, and create solutions to real-world problems.

The next generation of agricultural and natural resource leaders must be prepared to address the society's increasing and ever-changing demands, both locally and globally. To accomplish this mission, solutions to socio-environmental problems require input from professionals throughout multiple disciplines (Schmidt et al., 2012). A major societal demand is to keep pace with population growth, and produce more food in the next 50 years than has been produced in the past 10,000 years combined (UN Conference on Sustainable Development, 2007). Consideration for how to increase cross-curricular engagement throughout all levels of education may be a method to assist in preparing students for the 21st century workplace, where they will be required to assist in developing solutions to these societal demands and possess a diverse skill set that prepares them to think critically and engage globally.

Agriculturally literate and informed citizens possess the abilities to establish policies to support a competitive agriculture industry, domestically and internationally (National Research Council, 1988). Undergraduate students must be prepared to engage in problem solving and entrepreneurial thinking if our society hopes to conquer the challenge to sustainably feed the growing population. Fortunately, typical college students, today, are extremely unique and offer a strong hope for the future of our food supply. Students understand how to instantly access real-time information, extensive social networks, and live media that present them with new ideas on a daily basis (Oblinger, Oblinger, & Lippincott, 2005). Following many of the recommendations of the National Research Council (2009) can help create solutions to initiate change and implement new strategies to help produce a flexible, well-prepared workforce. An interdisciplinary approach to serve students in a variety of majors and career interests can assist in the development of transferrable skills; provide research opportunities, and participation in internships, outreach and extension (NRC, 2009).

Socio-environmental problems go beyond disciplinary, institutional and political boundaries. Interdisciplinary learning experiences focus on bridging research and policy, exploring problems, and developing solutions to take action to solve those local and global socio-environmental issues (Schmidt et al., 2012). Perhaps undergraduate interdisciplinary programs can be developed as a method to redesign the college experience through teamwork, multidisciplinary studies, and entrepreneurial thinking practices. These experiences will train students to focus on real world challenges while asking them to provide a viable solution.

The need for interdisciplinary education in academia is beginning to gain momentum, most notably at the graduate level (Morse, Nielsen-Pincus, Force, & Wulfhorst, 2007; National Academy of Sciences et al., 2005; Schmidt et al. 2012). As the need for future leaders to solve complex problems continues to grow, interdisciplinary approaches to train those leaders to be proficient in collective thinking and cross-disciplinary communication is necessary (Schmidt et al., 2012). Research efforts from professionals in multiple disciplines should be integrated to become aware of the complex, socio-environmental problems currently needing attention (Morse et al., 2007; NRC, 2009).

A review of the literature reveals much of the current research on interdisciplinary education focuses on research teams at the graduate level (Morse et al., 2007; National Academy of Sciences et al., 2005; Schmidt et al., 2012). Given the need to produce a workforce prepared to be successful in the 21st century, interdisciplinary programs at the undergraduate level may provide a solution to help bridge the gap to provide the necessary teamwork, problem solving, communication, and critical thinking skills current industry leaders report lacking in recent college graduates (Carnevale, Smith, & Melton, 2011). In order to efficiently work across disciplines, a system is required to train future leaders (Schmidt et al., 2012). At the graduate level, training can be narrowly provided while a comprehensive series of competencies are required to function outside of academia. Rarely do programs provide interdisciplinary training. Traditional graduate programs may be lacking the educational components required for students to successfully enter the 21st century workforce (Nerad, 2010). In response to this concern, increased importance for designing interdisciplinary approaches to graduate education have been considered to develop students' ability to address multifaceted socio-environmental problems and cultivate scientific research skills to prepare them for the workforce challenges they will face in the 21st century (Ewel, 2001).

The aim of this research was to examine the relationship of undergraduate students' goal orientation and their attitudes toward interdisciplinary education. A better understanding of the influences of goal orientation based on student interests and behaviors can assist in designing instructional settings that best represent the needs of the student (Duda & Nicholls, 1992; Dweck & Leggett, 1988). This research aligns with priority area three of the National Research Agenda which calls for a sufficient, scientific, and professional workforce that addresses the challenges of the 21st century. In order to drive sustainable growth, scientific discovery, and innovation in public, private, and academic settings, a sufficient supply of well-prepared agricultural scientists and professionals are needed (Doerfert, 2011). This research can provide implications for methods to tailor instructional practices, recruit, and better prepare undergraduate students for the 21st century challenges they will face. This research specifically focused on an interdisciplinary, problem solving approach related to the question, "How do we sustainably feed nine billion people by 2050?"

Theoretical/Conceptual Framework

The theoretical framework for this study was based on goal orientation theory developed by Vandewalle (1997). Goal orientation theory provides a framework to categorize differences in individuals' interests and behaviors when participating in scholastic undertakings (Vandewalle, 1997). Widespread research indicated individuals' affective, behavioral and mental responses in instructional settings can be influenced by goal orientation (Butler, 1992; Duda & Nicholls, 1992; Dweck & Leggett, 1988; Vandewalle, 1997). Goal orientation is measured by three facets. First, learning goal orientation which refers to the knowledge, behavior, skill or strategy an individual acquires to grasp new circumstances and develop aptitude (Schunk, 2012; Vandewalle, 1997). Performance goal orientation is divided into the second and third facet, performance prove goal orientation and performance avoid goal orientation. Performance prove goal orientation can be defined as the aspiration to demonstrate individual proficiency and gain positive judgments about one's proficiency. Performance avoid goal orientation can be defined as the aspiration to prevent the refuting of one's proficiency and to prevent negative judgments about one's proficiency (Vandewalle, 1997).

Duda and Nicholls (1992) investigated individuals' beliefs about the causes of success as a precursor of goal orientation. Their findings suggested that learning goal orientation can be related to a belief that effort is the source of success while performance goal orientation can be related to a belief that high ability is the source of success (Vandewalle, 1997). These findings may support past beliefs. Rogers (1969) posits that people are eager to learn and have the potential to

learn naturally. Meaningful learning is perceived by students as applicable and important to developing their individual self as a person as they transfer their knowledge to new contexts (NRC, 2000). Adolescents are influenced by the environment and mentors when ideal support systems and understanding of needs and choices are provided to guide their growth and development (Sheldon & Kasser, 2001). This study focused on goal orientation as it related to student achievement in order to determine if a relationship between undergraduate students' goal orientation and attitude towards interdisciplinary education existed.

Purpose & Research Objectives

The purpose of this study was to examine the relationships between undergraduate students' goal orientation disposition and their attitude towards interdisciplinary education. The study was driven by the following research objectives:

1. Describe undergraduate students' attitude towards interdisciplinary education.
2. Describe undergraduate students' goal orientation dispositions.
3. Identify the relationship between undergraduate students' goal orientation and attitude towards interdisciplinary education.
4. Identify how goal orientation predicts attitude towards interdisciplinary education in undergraduate students.

Methods

A descriptive correlational research design was used for this study. Due to the emergent nature of the research, the study was conducted as a pilot of a newly developed scale used to quantify undergraduate student attitude towards interdisciplinary education (UATIE). The UATIE was developed as part of a needs assessment. The needs assessment was conducted to determine undergraduate student interest in an interdisciplinary education program at the University of Florida College of Agricultural and Life Sciences. The instrument was administered in the spring of 2013 through Qualtrics© to a convenience sample of 328 undergraduate students majoring in a variety of disciplines. Additionally, the study was intended to explore the nature of the relationships between individual goal orientation (Vandewalle, 1997) and the newly developed UATIE scale.

Instrumentation

Undergraduate Attitude towards Interdisciplinary Education (UATIE). Based on a review of the literature we were unable to locate an established scale to measure undergraduate attitudes towards interdisciplinary education. Furthermore, the development of a scale particularly oriented towards an agricultural education context was unavailable. To address this gap in the literature a researcher-developed scale was employed.

The scale was developed based on a literature review, the established vision for a future interdisciplinary certificate program, and input by a previously selected panel of experts. The expert panel represented: agricultural education theory, food systems, hydrology, soil science, and biology. These experts were selected by the Dean of the college and were representative of a committee chosen to best represent the vision for the future interdisciplinary certificate program. The program vision planned to focus on challenging students to develop solutions to the world-wide problem to feed nine billion people by 2050. Based on the literature and input from the expert panel, a total of twelve interdisciplinary topic areas were identified: Water Quality, Water Availability, Nutrition, Human Disease Management, Animal Disease Management, Plant Disease

Management, Food Production, Energy Conservation, Renewable Energy, World Health Concerns, Economic Concerns, and Environmental Concerns.

The UATIE utilized a five-place bipolar response format. Six pairs of dissimilar statements were presented, one at each end of a rating scale. Negative statements were indicated by a one and positive statements were indicated by a five. Items two, three, and four did not have any descriptions associated; they represented bi-directional judgment placeholders within the scale. *For me, learning about (topic) would be: useful/useless; pleasant/unpleasant; good/bad; valuable/worthless; enjoyable/not enjoyable; worth my time/not worth my time.* The proposed scale was then reviewed by a second panel of experts representing agricultural education theory, research methodology, scale development theory, and survey design for face and content validity. Prior to data collection the scale was pilot tested on a similar population and three cognitive interviews were conducted to assure clarity of the instrument. Minor adjustments were made to the UATIE after the second expert panel review, pilot test, and cognitive interviews were conducted.

An index score for each topic area was calculated by averaging the six responses within the topic area. This procedure was completed for each of the twelve topic areas. Additionally, an overall attitude towards interdisciplinary education index score was calculated. The overall index score was calculated by averaging the 72 responses (twelve topic areas with six responses per area). *Ex post facto* reliability was calculated for each of the individual topic areas resulting in Cronbach's α values ranging from .92 to .96. The overall UATIE had an observed Cronbach's α of .98.

Individual Goal Orientation. Goal orientation disposition was gathered using the Vandewalle (1997) measure. The Vandewalle (1997) goal orientation disposition measure requires respondents to indicate their level of agreement on statements within three constructs: learning goal orientation, performance goal – prove orientation, and performance goal – avoid orientation. There were five statements related to learning goal orientation. An example of the type of statement related to learning goal orientation would be, *"I am willing to select a challenging work assignment that I can learn a lot from."* Four statements were related to performance goal – prove orientation. An example of the type of statement related to performance goal – prove orientation would be, *"I prefer to work on projects where I can prove my ability to others."* An additional four statements in the goal orientation disposition measure were related to performance goal - avoid orientation. An example of the type of statement related to performance goal avoid orientation would be, *"I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others."*

Individuals indicated their responses on a five-point, Likert-type scale with 1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neutral*, 4 – *Agree*, and 5 – *Strongly Agree*. Index scores were calculated for each of the three goal orientations by averaging responses within each group. *Ex post facto* reliability was calculated on each goal orientation. Results indicated learning goal orientation had a Cronbach's α of .82, performance goal - prove had a Cronbach's α of .81, performance goal - avoid had a Cronbach's α of .88.

Population and Sample

The population of interest for this study was undergraduate students enrolled at a single southern land grant university interested in implementing an interdisciplinary program focused on food security. A convenience sample of students enrolled in a Research and Business Writing course and a Principles of Microbiology course were invited to participate in the survey. The purpose for selecting these two courses was to capture responses from undergraduates majoring in a variety of disciplines within the College of Agricultural and Life Sciences at the University of Florida, the target audience for the interdisciplinary program. Attitudes from students in these specific courses were also being targeted to assist in the design and implementation of an undergraduate interdisciplinary certificate program.

Students enrolled in these courses most commonly reported major enrollment in biology (23%) and food science and human nutrition (21%). The majority (88%) reported plans to attend graduate school. A convenience sample was deemed to be appropriate given the population of interest (Peterson, 2001). However, due to selection bias associated with the research design, results are not generalizable beyond the sample (Ary, Jacobs, & Sorensen, 2010).

An email containing a link to the questionnaire was sent to the instructor of each course. The instructors then emailed the link to all individuals enrolled in the two courses ($n = 338$), inviting them to complete the online questionnaire. A total of 230 usable responses were collected for a response rate of 68%. Participation was voluntary and respondents were offered course extra credit, determined by each instructor, as an incentive to complete the questionnaire. Nonresponse analysis was conducted by comparing early and late respondents based on the recommendations of Lindner, Murphy, and Briers (2001). No statistically significant differences between the two groups were observed. Consequently, non-response bias was not found to be an issue.

Participant demographics were analyzed using descriptive statistics. Respondents were 31.7% ($n = 73$) male and 68.3% ($n = 190$) female; gender was not reported by four participants. The average age of respondents was 22 ($M = 21.8$, $SD = 1.9$), with an age range of 19 to 34. Respondents self-reported their race and ethnicity; 66.5% ($n = 153$) identified their race as White, 6.1% ($n = 14$) identified themselves as Black or African American, 16.5% ($n = 38$) identified themselves as Asian or Pacific Islander, and 5.2% ($n = 12$) identified themselves as Other. Additionally, 11.7% ($n = 27$) of respondents identified their ethnicity as Hispanic/Latino (a).

Results

Undergraduate Attitude towards Interdisciplinary Education

Respondents were asked to rate their attitude toward twelve unique interdisciplinary education topics using the UATIE. Table 1 displays respondents' attitude towards each of the unique topic areas. The overall attitude index score was calculated by averaging the responses resulting in a mean score of 3.90 ($SD = .73$).

Table 1
Undergraduate Attitude towards Topics in an Interdisciplinary Education Program (n = 230)

Interdisciplinary Topics	M	SD
Nutrition	4.28	0.80
Human Disease Management	4.25	0.74
World Health Concerns	4.00	0.86
Water Availability	3.98	0.88
Water Quality	3.95	0.87
Food Production	3.86	0.94
Environmental Concerns	3.86	0.92
Animal Disease Management	3.84	1.00
Renewable Energy	3.83	0.97
Energy Conservation	3.79	0.93
Economic Concerns	3.75	0.93
Plant Disease Management	3.51	1.01

Note. 1 = negative attitude; 2, 3, and 4 represent bi-directional judgment placeholders within the scale: For me, learning about (topic) would be: useful/useless; pleasant/unpleasant; good/bad; valuable/worthless; enjoyable/not enjoyable; worth my time/not worth my time; 5 = positive attitude

Undergraduate Goal Orientation Dispositions

Goal orientation dispositions in undergraduate students were calculated using the Vandewalle (1997) scoring key. Goal orientation scale scores were based on five point Likert-type scales. Table 2 displays respondents' level of learning goal orientation, performance-prove goal orientation, and performance-avoid goal orientation. The learning goal orientation index score was calculated by averaging the five responses associated with the construct resulting in a mean score of 4.15 (SD = .54). The performance-prove goal orientation index score was calculated by averaging the four responses associated with the construct resulting in a mean score of 3.84 (SD = .74). The performance-avoid goal orientation index score was calculated by averaging the four responses associated with the construct resulting in a mean score of 2.83 (SD = .90).

Table 2
Undergraduate Goal Orientation (n = 230)

	M	SD
Learning Goal Orientation	4.15	0.54
Performance-Prove Goal Orientation	3.84	0.74
Performance-Avoid Goal Orientation	2.83	0.90

Note. 1=strongly disagree; 2=disagree; 3=neither agree not disagree; 4=agree; 5=strongly agree

Relationships between Goal Orientation and UATIE

Correlations between goal orientation disposition index scores and the overall UATIE score were calculated. Correlation coefficients and statistical significance between items are provided in Table 3. Correlations ranged from negligible to low in magnitude, based on Davis' (1971) convention. Attitude towards interdisciplinary education had a statistically significant low positive correlation with learning goal orientation (r = .22) and performance goal – prove orientation (r = .21).

Table 3
Intercorrelations between UATIE and Goal Orientation Disposition (n = 230)

Variable	1	2	3	4
1. UATIE	-			
2. Learning Goal Orientation	0.22**	-		
3. Performance Goal – Prove Orientation	0.21**	0.26**	-	
4. Performance Goal – Avoid Orientation	0.02	-0.14*	0.24**	-

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

Goal Orientation Predicting UATIE

Multiple regression was used to determine the level at which goal orientation predicted UATIE. The UATIE overall index score was treated as the dependent variable and the three types of goal orientation disposition were treated as the independent variables. Unstandardized regression coefficients in the form of variable level effects along with statistical significance are provided in Table 4. Overall, 7.1% of the variance in UATIE was explained by the three facets of goal orientation (R^2 = .07, $F(3, 225)$ = 5.74, p = .001). Learning goal orientation and performance-prove goal orientation were found to be statistically significant predictors of UATIE when controlling for performance-prove goal orientation.

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Table 4
Multiple Regression of Goal Orientation and UATIE (n = 228)

Goal Orientation facet	b	p
Intercept	2.30	
Learning goal orientation	.24	.01**
Performance-Prove	.16	.02*
Performance-Avoid	.00	.96

Note. R^2 = .07, *p <.05, **p <.01

Conclusions, Implications, and Recommendations

Based on the findings of this research, students who are learning goal oriented are more apt to be interested in enrolling in an undergraduate interdisciplinary program and should be targeted as potential participants. This research supports the findings of Duda and Nicholls (1992) that individuals' beliefs about the causes of success are a foundation for goal orientation. Undergraduate college departments should consider methods to capitalize on the socio-environmental needs both locally and globally, while drawing from the strengths of current college students to teach them to be the independent thinkers and problem solvers of tomorrow. Goal orientation theory (Vandewalle, 1997) assists in providing a context to classify distinctions between students' interests and behaviors throughout the duration of their learning processes. Improved understanding of goal orientation as it relates to a group of students can benefit the instructor's design and implementation of the course to better fit the needs of the student.

This research indicated undergraduates at the University of Florida College of Agricultural and Life Sciences were most interested in nutrition followed by human disease management and water issues. These undergraduates were less interested in economic concerns and plant disease management issues. Although these findings should not be generalized beyond these students, further study is needed to understand why some issues were of more interest to these students than others. This understanding could lead to developing instructional materials that focus on key interest factors, thus better motivating learners to deeply engage in a variety of topics, and gain the skills inherent in interdisciplinary study (Schmidt, et al., 2012).

The undergraduate students' learning goal orientation and performance goal orientation – prove were found to influence attitude toward interdisciplinary education. It was found that for every one unit increase in learning goal orientation there was a 2.6 unit increase in attitude. This finding is supported by goal orientation theory (Vandewalle, 1997) and implies that the more a student is focused on learning for the sake of obtaining more information, rather than for a grade, the more likely they will be interested in a variety of subjects. Perhaps, as educators develop interdisciplinary programs, knowing that students attracted to this type of program are more interested in learning for the sake of learning, should focus their time and attention on less structured courses that focus on personal development rather than a final grade. This finding is also supported by Rogers (1969) humanistic theory that people learn naturally and are eager to learn when the knowledge gained is perceived important to develop one's self. Personal development in courses could be structured by providing opportunities for students to work collaboratively in teams, build confidence through application of knowledge and practice, and construct knowledge through experience.

The factor of performance goal orientation – avoid was not found to be a predictor of student attitude toward these topics. This finding implies that students eager to perform well, typically by receiving a high grade in a class, did not have a strong attitude towards participating in interdisciplinary education. This finding is supported by goal orientation theory (Vandewalle, 1997) based on the fact that individuals seek to prevent disapproval and negative judgments about their proficiency. Students possessing performance-avoid, should not be excluded from target populations, but may be less likely to pursue interdisciplinary programs given their orientation to

be less inclined to show interest in multiple subjects. Perhaps these students are already driven in an academic direction, such as going to medical school or veterinary school, and therefore are not inclined to be interested in learning about a variety of topics.

To apply the findings of this research to future students, it is recommended that academic advisors and instructors consider using Vandewalle's (1997) goal orientation scale to identify individual student goal orientation to better understand the attitudes of their students. This information should be discussed and shared with the student to provide them with an understanding of their personal goal-orientation and how that orientation may influence the decisions they make. It is recommended that if goal orientation theory (Vandewalle, 1997) is used to target populations for undergraduate interdisciplinary programs, the scale should be administered as early as high school, or during the first or second year of college, when students may still be making major selection decisions.

The majority of the students who responded (88%) indicated plans to pursue a graduate degree immediately following their undergraduate coursework. Their time may be limited and therefore their interests are focused. If this is the case, developers of interdisciplinary programs should focus their attention on students who have not already chosen a career path. Educators often focus their attention on students that are seen as high achievers (based on grades), however, in this case, these students may already be driven in a specific direction and have closed themselves off to new opportunities. Even though a student may not be seen as a high achiever in the traditional sense, perhaps when given an opportunity to see connections between a variety of subject matter areas and the impact they can have on the world, they will be more motivated to achieve. Based on this finding, and supported by the recommendation of the National Research Council (2009), it is suggested that interdisciplinary education be introduced to students as early as possible. School-based agricultural education programs provide ripe opportunities for interdisciplinary collaboration and should be utilized to introduce students to a variety of educational opportunities.

Future research efforts should replicate this study at other universities, in a variety of colleges, throughout the United States and in countries where food security concerns are even more prevalent. Additionally, future research using qualitative methods in the area of undergraduate interdisciplinary programs is recommended. Gaining a better understanding of this phenomenon throughout the world will provide institutions with access to pertinent information to aid in the design of interdisciplinary education programs, focused on the specific needs of the community. Feeding the growing global population is a problem all citizens should be devoted to help solve. An interdisciplinary approach to attract students from all colleges within an institution to collaborate and evaluate the problems and solutions to sustainably feed the growing world population should be an institutional priority (Schmidt et al., 2012).

Further research should be conducted to test the UATIE scale with students in secondary education. School-based agricultural education programs offer numerous opportunities to integrate a variety of socio-environmental topics, as well as, the natural integration of STEM concepts and life skills (Dailey, Conroy, & Shelley-Tolbert, 2001; Roegge & Russell, 1990; Warnick, Thompson, & Gummer, 2004). These are the skills required of the next generations of agriculture and natural resource leaders to critically think and problem solve to discover the solutions to the question of "How do we sustainably feed nine billion people by 2050?"

The "next generation" of students today is extremely unique (Oblinger et al., 2005). Therefore, unique approaches to education should be considered in order to provide a solid foundation of knowledge in the food, economic, environmental, health and social systems. A better understanding of student attitude towards goal orientation can help provide information to better prepare and structure courses that will benefit students, by preparing them to be the sufficient scientific, and professional workforce that is needed to address the challenges of the 21st century (Doefert, 2011).

This research applies goal orientation theory (1997) to provide evidence and support for past research efforts (Morse et al., 2007; National Academy of Sciences et al., 2005; Schmidt et al.,

2012) to aid institutions in the design of interdisciplinary education programs which support the behaviors and interests of undergraduate students examined in this research. Perhaps undergraduate interdisciplinary programs can be developed to redesign the college experience through teamwork, multidisciplinary studies and entrepreneurial thinking practices, thus creating critical thinkers and problem solvers that can focus on solutions to the real-world challenges all citizens are faced with every day.

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