Motivation in Agricultural Science

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Introduction

A critical need continues to exist for professionals in the workforce with informed backgrounds in science, technology, engineering and mathematics (STEM) topics (Jones et al., 2018). Projected labor needs indicate STEM concentrations are the fastest growing career-fields and essential to our economic advancement and national defense (Carnevale et al., 2013). Agricultural education plays a major role in contextualizing STEM content through the national agricultural, food, fiber, and natural resources systems (Chumbley et. al, 2015; Myers & Dyer, 2006; Parr et al., 2006; Scherer et al., 2019).

Theoretical Framework

Our study viewed through the lens of Azjen's theory of planned behavior (1991). The theory of planned behavior (Azjen, 1991) extends from Fishbein and Azjen's theory of reasoned action (1975). When the data for our study is holistically analyzed through this theory, the value and benefit of learning contextualized science by students is evident.

Methods

This study utilized the Science Motivation Questionnaire II (SMQ-II), a 25-item instrument that included five constructs: *intrinsic motivation*, *self-determination*, *self-efficacy*, *career motivation*, and *grade motivation*. Each question is answered on a five-point Likert-type scale: never (1), rarely (2), sometimes (3), often (4), or always (5). Analyzing Likert-type and Likert-scale are different and should be reported accordingly (Boone and Boone, 2012). Glynn and Koballa (2006) posited the questionnaire was applicable in all facets of science. For the purposes of our study, the general term of "science" was replaced with the term "agricultural science." The reliability test indicated the modified questionnaire used in this study had the same Cronbach's alpha Coefficient ($\alpha = 0.92$) as the original SMQ II.

This descriptive study focused on high school students in the state of Texas enrolled in agriculture education and members of the National FFA Organization. High School students that competed and participated in the state agricultural mechanics CDE were the population used in this study. After IRB, the SMQ was given to students after the completion of event. In total there were 144 students who competed in the event, with 88 students electing to complete the survey. We received 73 surveys that were acceptable. There were six participants who identified as female and 67 who identified as male. Many of the participants identified as White ($n = 59$, 67%), while three (3%) identified as Hispanic, and nine (10%) as Biracial. There was a total of 31 seniors, 24 juniors, 14 sophomores, and four freshmen.

Findings

The demographic factors viewed in this study included biological sex, ethnicity, and grade level. The highest mean scores measured for males were found related to *Self-Efficacy* ($M = 3.74$, $SD = 0.85$) and *Career Motivation* ($M = 3.73$, $SD = 0.94$). The highest means scores for females were found related to *Grade Motivation* ($M = 4.00$, $SD = 0.59$) and *Career Motivation* ($M = 3.83$, $SD = 1.08$). The lowest mean scores for males were found related to *Intrinsic Motivation* ($M = 3.48$, $SD = 0.78$) and *Self-Determination* ($M = 3.19$, $SD = 0.95$). The lowest mean scores for females

were found related to *Self-Efficacy* (*M* = 3.50*, SD* = 0.60) and *Self-Determination* (*M* = 3.03*, SD* = 0.92).

The highest means scores for those who identified as Hispanics were found related to *Grade Motivation* (*M* = 3.93, *SD* = 1.17). For those who identified as Biracial the highest mean scores were found related to *Self-Efficacy* (*M* = 4.07, *SD* = 0.76). Those who identified as White had the highest mean scores related to *Career Motivation* (*M* = 3.81, *SD* = 0.94).

The researchers found the highest mean scores for Freshman were related to *Self-Efficacy* (*M* = 4.40*, SD* = 0.43). The highest means scores were *Grade Motivation* for both Sophomores (*M* = 3.90*, SD* = 1.34) and Juniors (*M* = 3.65*, SD* = 0.80). Senior students were found to have the highest scores related to *Career Motivation* (*M* = 3.90*, SD* = 1.00). The lowest mean scores were found related to *Intrinsic Motivation* for both Freshman (*M* = 3.85*, SD* = 0.62) and Sophomore (*M* = 3.40*, SD* = 0.99) students. The lowest mean scores were found related to *Self-Determination* for both Junior (*M* = 2.89*, SD* = 0.74) and Senior (*M* = 3.18*, SD* = 0.99) students.

Conclusions & Recommendations

When comparing science motivation and demographic characteristics, the researchers found that those who identified as male had the highest mean score related to *self-efficacy.* Additionally, those who identified as female had the highest mean score related to *grade motivation.* Researchers came to the consensus that female students were more intrinsically motivated to learn science and held the belief that they will succeed in the course to more success than their male peers.

The researchers found that those who identified as Hispanic had the higher scores related to *grade motivation*. The researchers believe that these findings suggest Hispanic students are motivated by the grade results of the effort they put in their science courses. The lowest mean scores found for all three ethnicities were related to *self-determination.* The researchers came to the consensus that there is a higher value on extrinsic motivational factors which can lead to negative effects of *self-determination* on the individual student.

The researchers found that those students from the junior and senior grade levels had the highest scores in *career motivation*. The researchers believe that these scores are due to the fact that most juniors and seniors are preparing to start either post-secondary education or a career in the field of corresponding science that interests them the most. The possibility of attaining a career in this field is what drives students to be successful in their respective science courses.

The strengthening of the classroom learning environment through more contextualized learning would enhance student learning boosting the individual students' moral across all five observed constructs. This is accomplished through content teaching that inspires students to connect the knowledge they learn in the classroom with the experiences that encompasses their lives. In schools, shared planning and even shared teaching, when possible, between agricultural and STEM teachers can lead to lessons that mutually reinforce each other, providing context to the STEM content and providing STEM skills to the agricultural courses. The implementation of science in the classroom promotes the contextual content learning environment yielding the result of stronger educators, leaders, team members, and future contributing members of society.

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