Presence of the Theory of Planned Behavior in Agricultural Science Education: A Longitudinal Quantitative Study

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Introduction

The National Institute for Occupational Safety and Health (NIOSH) ranks agriculture among the most hazardous occupations in the United States. In 2014, an estimated 893,000 youth under 20 years of age lived on farms, with 454,000 children performing farm work (National Institute for Occupational Safety and Health, 2019). Furthermore, older-age farmers and family workers involved in the farming operations have higher fatal tractor overturn risks than their younger counterparts (Myers & Hendricks, 2009).

In a previous study analyzing the effectiveness of CROPS, there appears to be a trend that the Apprenticeship of Observation theory hinders the success of the curriculum (Schafbuch et al., 2016). The Apprenticeship of Observation theory plays a role in enhancing attitudes, subjective norms, and perceived behavioral control regarding tractor safety (Tingle et al., 2018).

The Apprenticeship of Observation theory originated with Dan Lortie's (1975) identification of the period students spend as observers in schools before teaching. Students spend years developing perceptions of what they believe teaching is, developing deep-seated notions of a subject area, the structure of pedagogy, and what constitutes teaching practice. When considering how youth are taught proper farm safety practices, it often comes from adults who teach the youth as either the adults were taught or grew up experiencing (Mazur, 2013). Many adults are aware of agricultural dangers, but due to time constraints, money, or traditional views, they do not embrace safe behavioral practices (Lee et al., 1997); thus, the young student or apprentice begins modeling the poor safety practices into their own work ethic (Baker et al., 2001).

Theoretical Framework

The Theory of Planned Behavior (TPB; Ajzen, 1991) emerged as an appropriate framework for evaluating tractor safety instruction while analyzing human behavior within the secondary agriculture mechanic curriculum. The TPB explains that three determinants influence a student's intention: attitudes towards behaviors, the subjective norms regarding behavior, and perceived behavioral control.

Methodology

Longitudinal research is a methodology common among scholarship yet emerged in the last 30-years (Given, 2008). To qualify as longitudinal, a study must consist of one or more of the following: (a) data are collected for each item or variable for two or more distinct time periods; (b) the subjects or cases analyzed are the same or at least comparable from one period to the next; or (c) the analysis involves some comparison to data between or among periods (Menard, 2002).

The focus of longitudinal quantitative research is to view time as both an outcome and a predictor, collect data on both time-varying and time-invariant measures, collect data prospectively whenever possible, collect data beginning in multiple base years, and collect data at all relevant times throughout the study (Singer & Willett, 1996).

Results

This longitudinal quantitative study sought to determine if the curriculum intervention and agriculture teacher could positively change behaviors set by the presence of the Apprenticeship of Observation. The following research questions aided in obtaining the purpose of this study:

1. Describe the behaviors (attitudes, subjective norms, perceived behavioral, and behavioral intentions) prior to the curriculum intervention each academic school year.
2. Describe the behaviors (attitudes, subjective norms, perceived behavioral, and behavioral intentions) following the curriculum intervention each academic school year.
3. Determine the change in behavior (attitudes, subjective norms, perceived behavioral, and behavioral intentions) by each academic year.

Although a difference did exist each year between the pre- and post- evaluation, research objective 3 sought to determine if the differences were significant at an a priori level of .05 (see Table 1). Each year of the CROPS curriculum intervention, the students' behavioral intentions increased significantly (2016-2017 $t = 3.68$; $p = 0.01$; 2017-2018 $t = 3.03$; $p = 0.01$; 2018-2019 $t = 3.27$; $p = 0.01$). Only year 1 did students provide a significant increase in their attitudes (2016-2017 $t = 2.44$; $p = 0.02$). The remainder behavior constructs of Attitude, Subjective Norms, and Perceived Behavioral Controls were not a significant change. In fact, the students' perceived subjective norms decreased after the curriculum intervention had concluded each year.

Table 1

Paired Sample t-test of Pre-Post Behavioral Constructs by Year

Year	Attitude		Subjective norms		Perceived behavioral control		Behavioral intention	
	t	*p*	t	*p*	t	*p*	t	*p*
2016 – 2017	2.44	0.02*	0.79	0.43	0.18	0.86	3.68	0.00*
2017 – 2018	1.55	0.13	1.00	0.32	1.58	0.12	3.03	0.00*
2018 – 2019	1.13	0.26	1.61	0.38	0.88	0.38	3.27	0.00*

Note. $*p \leq 0.05$

Conclusion and Recommendations

In this three-year quantitative longitudinal study, the researchers explain the complexity of the Theory of Planned Behavior model. Each element of TPB works together to make an impact on shifting a child's behavior. For the current study, there was not a significant change most and/or every year in attitude, subjective norms, or perceived behavioral control. In fact, subjective norms decreased every year over the course of the curriculum intervention.

In the analysis of students' behavioral intent (Ajzen, 1991), it was apparent they viewed CROPS as a benefit in installing tractor rollover structures. The teacher and the CROPS curriculum improved the behavioral intent among students. Additional research in agricultural science education highlights the importance of behavioral beliefs to benefit classrooms and communities (Roberts et al., 2019). The researchers recommend using the TPB, but teachers must understand that overcoming the subjective norms will require teachers to form additional partnerships in the teacher's community.

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