Journal of Agricultural Systems, Technology, and Management

Volume 25
August 2014

Selected Factors Influencing Missouri School-Based Agricultural Educators to Instruct Agricultural Mechanics Curriculum

P. Ryan Saucier[1], Sheyenne Krysher[2]

[1] Assistant Professor, Department of Agriculture, Texas State University, 601 University Drive, San Marcos, TX 78666. Phone: 512-245-3325 FAX: 512-245-3320 Email: ps51@txstate.edu

[2] Post-Doctoral in Distance Education, Department of Agricultural Sciences and Engineering Technology, P.O. Box 2088, Huntsville, TX 77341, USA. Email: krysher@shsu.edu

Abstract

The National Research Agenda for Agricultural Education and Communications suggests that teachers promote “highly effective educational programs [that] meet the academic career and developmental needs of diverse learners in all settings and at all levels” (Doerfert, 2011, p. 24). The purpose of this census survey was to determine the factors influencing Missouri school-based agricultural educators to instruct the curriculum found within the course Agricultural Construction 1 and/or 2. Data were collected via Hosted Survey™ from all teachers who instructed this course during the 2009-2010 academic school year (N = 257). The majority of the respondents chose to teach the curriculum areas found within the course; however Project Construction curriculum was the most commonly taught curriculum area. The factor, Personal Importance, was found to be the most influential factor impacting school-based agriculture educators’ decision to teach all of the agricultural mechanics curriculum areas. Administration Importance was the least influential factor persuading teachers to instruct the agricultural mechanics curriculum areas. Researchers recommend future studies to better understand the phenomenon of curriculum instruction choice by teachers and implement professional development to increase teacher skill and pedagogy competence.

Keywords**:** agricultural educators, school-based, agricultural mechanics, curriculum

Introduction and Literature Review

Instructional practices, which are implemented in the classroom and laboratory by educators, are somewhat based on a teacher's choice to instruct the curriculum content with the resources allocated to them and within the schools' learning environment (Knobloch, 2008). The predetermined beliefs of teachers often influence how they connect academic content in the classroom to real-life applications in the laboratory or community (Knobloch, 2008). Frequently, these beliefs are developed in part from personal beliefs about the curriculum or content (Borko & Putnam, 1996; Moseley, Reinke, & Bookout, 2002; Pajares, 1992), availability of time, availability of instructional resources, level of preparation regarding the content (Thompson & Balschweid, 1999), comfort level with the content, (Knobloch & Ball, 2003), perceived value of the content (Lawrenz, 1985), past experiences with the content area (Calderhead, 1996; Thompson & Balschweid, 1999), teaching environment (Knobloch, 2001), and motivation (Bandura, 1997; Tschannen–Moran, Woolfolk-Hoy, & Hoy, 1998). The development and performance of teachers is also influenced by the interaction of these personal and environmental factors and the situations in which they teach (Knobloch, 2001). *The National Research Agenda for Agricultural Education and Communications* suggests that teachers promote "highly effective educational programs [that] will meet the academic, career, and developmental needs of diverse learners in all settings and at all levels" (Doerfert, 2011, p. 24). As teacher educators, if we can understand the factors that influence teachers' decisions to instruct various aspects of the curriculum, can we then help shape a more fruitful environment for student academic mastery and teacher performance?

Theoretical Framework

The Theory of Planned Behavior was used as the theoretical base for this study (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). This theory was developed to understand a person's behaviors over which people have incomplete *volitional control*. According to Ajzen (1991), a persons' intention to complete an activity is based upon four influential factors: *attitude towards the behavior*; *the subjective norm*; *motivational factors*; and *perceived behavioral control*. Furthermore, this theory suggests that investigators should not only look at beliefs, attitudes, and the intentions of individuals, but also their behavior (Ajzen, 1988). A central factor in the Theory of Planned Behavior (Ajzen, 1991) is that an individual's intention to perform a given behavior, i.e. instruct agricultural mechanics curriculum, are assumed, and can be used to capture the *motivational factors* that influence a behavior. Motivational factors are considered to be indications of how hard people are willing to try and how much of an effort they are planning to exert in order to perform the behavior (Ajzen, 1991). The theory further identifies *non-motivational factors* that can be used to determine a person's performance at a given behavior. These non-motivational factors can include the availability of requisite opportunities and resources that include: time, money, personal skill level, and the cooperation of others (Ajzen, 1991). Collectively, *motivational and non-motivational* factors represent a person's actual control over a behavior. Furthermore, the theory states that if a person has the required opportunities and resources, and intends to perform the behavior, the person should succeed in their behavior.

Moreover, the component, *subjective norm*, included in Ajzen's theory (1991) represents the perceived social pressures on the individual. These *subjective norms* refer to peoples' beliefs about other people's attitudes towards the behavior and how important their opinions are. In this study, the *perceived behavioral control* component refers to the extent to which teachers believe

themselves to be capable of teaching curriculum which is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1988). The inclusion of this component in Ajzen's theory recognizes that if teachers are not confident about their ability to perform curriculum skills, then they may feel unable to teach the curriculum in the classroom or laboratory. By understanding the factors that influence a teachers' decision to instruct curriculum, professional development opportunities can be developed to aid teachers in skill and pedagogical development; thus, aiding in student academic achievement by providing quality skill-based experiential learning opportunities in the classroom and the laboratory. An illustration of the Theory of Planned Behavior (Ajzen, 1991) can be found in Figure 1.

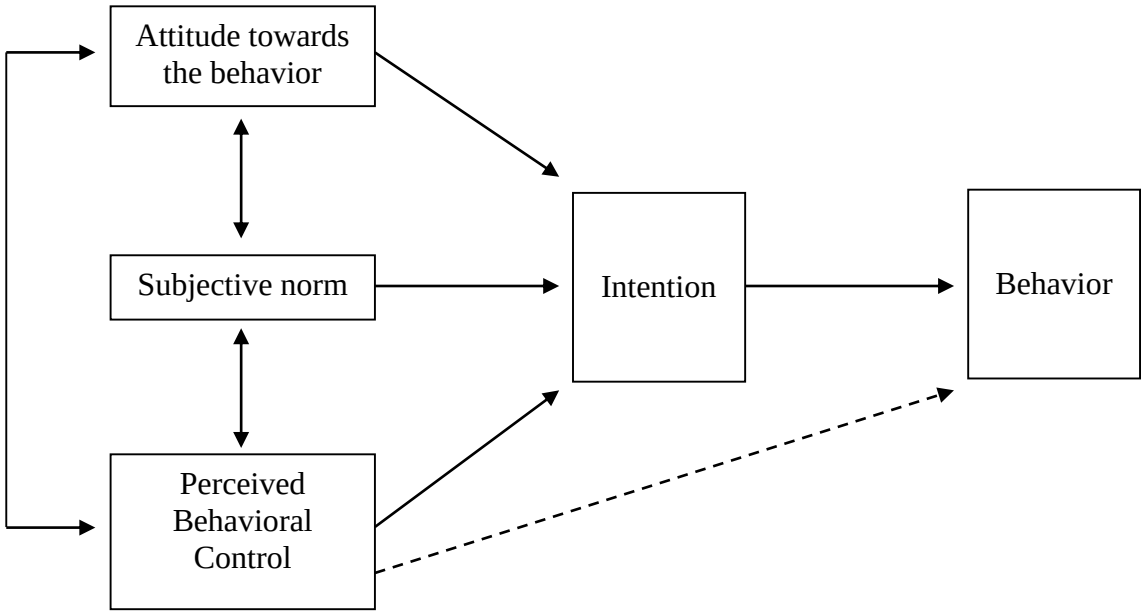

Figure 1. Theory of Planned Behavior (Ajzen, 1991)

Purpose and Research Questions

The purpose of this study was to describe the factors that influence Missouri school-based agriculture teachers' choice to teach specific curriculum found within the agricultural education course entitled Agricultural Construction 1 and/or 2.

1. What are the personal, professional, and program characteristics of school-based agricultural educators in Missouri who teach the agricultural education course Agricultural Construction 1 and/or 2?
2. Which of the selected curriculum components of the agricultural education course Agricultural Construction 1 and/or 2 do Missouri school-based agricultural educators choose to teach?
3. What factors influence Missouri school-based agricultural educators' decisions to teach selected curriculum components of the agricultural education course Agricultural Construction 1 and/or 2?

Methods

Population

The target population consisted of all school-based agriculture teachers (*N* = 257) in Missouri who taught the agricultural education course Agricultural Construction 1 and/or 2 during the 2009-2010 academic school year. The frame for this study was obtained from the *2009-2010 Missouri Agricultural Education Directory*, published by the Missouri Department of Elementary and Secondary Education (2009). Every school-based agricultural education teacher in Missouri was contacted via email and/or phone to determine if they teach the course in question. Of the teachers contacted, 257 identified themselves as part of the desired study population.

Instrumentation

Data were collected through a researcher-designed, web-based questionnaire. The two section questionnaire was distributed using Hosted Survey™. Section I was composed of questions related to the instruction of six skill-related curriculum areas (e.g. Arc Welding, Finishing, Metals, Oxy-Gas and Other Cutting/Welding Processes, Project Construction, & Woodworking) included in the Agricultural Construction 1 and/or 2 curriculum. This section also contained questions relating to the factors that influence, or do not influence, a teacher to teach the selected components of the curriculum. A five-point, summated rating scale was offered for respondents to provide information about factors that influence their decision to teach, or not to teach, a curriculum component. The response scale for each factor was: 0 = *no influence*, 1 = *little influence*, 2 = *some influence*, 3 = *moderate influence*, and 4 = *great influence*. Section II of the instrument consisted of ten questions designed to collect information on personal, professional, and program demographics of the respondents and the school-based agricultural education program in which they teach.

To ensure the validity of the instrument, a panel of experts (*N* = 7) was used to review the instrument for face and content validity. Recommendations from the panel were then utilized to improve the instrument design. To estimate the reliability of the instrument, a pilot study was conducted with a similar population of 23 school-based agriculture teachers in the neighboring state of Kentucky. Of the 23 teachers contacted, 22 (96%) completed all items in Sections I and II. The resulting Cronbach's alpha coefficients for the curriculum constructs ranged from .73 to .91. Garson (2008) and Nunnally (1978) identified .70 as the level at which a scale may be considered internally consistent, thus the constructs found within the instrument were deemed reliable.

Procedures

The Dillman (2007) Tailored Designed Method for Internet Surveys was utilized to guide the data collection process for this study. Subjects were contacted up to five times through electronic mail from the researcher. In the end, 203 (79%) Missouri agricultural educators provided usable responses. Non-response error was a relevant concern; however due to the descriptive nature of a census, the results of this study could only be extrapolated to the respondents and not beyond.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences® (SPSS) 17.0 for Windows and Microsoft Office Excel® 2007. Data analysis methods were selected as a result of determining the scales of measurement for the variables measured. Results of the study should be limited to the respondents and not to the overall population due to the descriptive nature of a census.

Results

Research Question One

Of the 203 teachers who participated in this study, 83.30% were male (*n* = 169). The mean age for teachers was 37.26 years (*SD* = 9.83). The mean number of university semester credit hours earned in agricultural mechanics coursework was 10.71 *(SD* = 11.35). On average, Missouri school-based agriculture teachers who instructed Agricultural Construction 1 and/or 2 had 12.66 years of teaching experience (*SD* = 9.06). The subjects supervised students' agricultural mechanics SAEs for an average of 4.90 hours per week (*SD* = 6.65). In addition, the mean enrollment of students in the agricultural education program, in which the respondents taught, was approximately 94 students (*M* = 93.71; *SD* = 65.38). Furthermore, over 90% (*n* = 185; 91.10%) of the respondents reported that they completed a traditional teacher certification program. The remainder of the subjects reported they completed some form of an alternative teacher certification program (*n* = 18; 8.90%).

Research Question Two

Research question two sought to identify the curriculum areas that school-based Missouri agricultural educators taught within the course Agricultural Construction 1 and/or 2. Over four out of five respondents (*n* = 172; 84.70%) reported they teach arc welding curriculum. Over seventy percent (n = 143; 70.40%) of teachers indicated to the researcher that they teach finishing curriculum. Metals curriculum was also reported as being taught by over two-thirds of the respondents (*n* = 140; 69.00%). Oxy-gas and other cutting/welding processes was the third most taught curriculum area. Respondents (*n* = 171; 84.20%) also indicated that they teach this curriculum in the course Agricultural Construction 1 and/or 2. Nearly 9 of every 10 teachers (*n* = 180; 88.70%) indicated they teach project construction curriculum. Furthermore, almost two-thirds of respondents (*n* = 124; 61.10%) reported that they taught the curriculum area, woodworking (see Table 1).

Table 1. Curriculum Areas Taught by Missouri School-Based Agriculture Teachers Who Instruct Agricultural Construction 1 and/or 2 (n = 203).

	Yes		No	
Curriculum Areas	*f*	%	*f*	%
Arc Welding	172	84.70	31	15.30
Finishing	143	70.40	60	29.60
Metals	140	69.00	63	31.00
Oxy-Gas and Other Cutting/Welding Processes	171	84.20	32	15.80
Project Construction	180	88.70	23	11.30
Woodworking	124	61.10	79	38.90

Research Question Three

Missouri school-based agriculture teachers who instruct Agricultural Construction 1 and/or 2, indicated that *Personal Importance* was the greatest factor that influenced their decision to teach arc welding curriculum to students (*M* = 3.50; *SD* = 0.63). Conversely, the factor *Administration Importance* was the least important factor influencing their decision to teach arc welding curriculum to students (*M* = 2.41; *SD* = 1.10). A summary of the remaining factors that influenced teachers to instruct arc welding are displayed in Table 2.

Within the curriculum area of finishing, teachers indicated that the factor *Personal Importance* impacted their decision to instruct this curriculum area to their students the greatest (*M* = 2.86; *SD* = 0.95). Moreover, *Administration Importance* influenced teachers the least to teach

finishing curriculum to students enrolled in Agricultural Construction 1 and/or 2 (*M* = 2.12; *SD* = 1.09). Additional data concerning this curriculum area are displayed in Table 2.

Respondents who instruct Agricultural Construction 1 and/or 2, indicated that *Personal Importance* was the greatest factor that influenced their decision to teach metals curriculum to students (*M* = 2.72; *SD* = 0.91). However, the factor *Administration Importance* played the least important role in influencing their decision to teach metals curriculum to students (*M* = 1.95; *SD* = 1.06). See Table 2 for a summary of the remaining factors that influenced teachers to instruct metals curriculum.

Oxy-gas and other cutting/welding processes was another curriculum area found with the agricultural education course entitled Agricultural Construction 1 and/or 2. *Personal Importance* was the factor that had the greatest influence on a teachers' decision to teach oxy-gas and other cutting curriculum to students (*M* = 3.16; *SD* = 0.81). However, the factor *Administration Importance* played the least important role in influencing a teacher's decision to teach oxy-gas and other cutting/welding processes curriculum to students (*M* = 2.24; *SD* = 1.04). The remaining factors that influenced teachers to instruct oxy-gas and other cutting/welding processes are displayed in Table 2.

Within the curriculum area of project construction, teachers indicated that the factor *Personal Importance* impacted their decision to teach this curriculum area to their students the greatest (*M* = 3.40; *SD* = 0.73). Moreover, *Administration Importance* influenced teachers the least to teach project construction curriculum to students enrolled in Agricultural Construction 1 and/or 2 (*M* = 2.57; *SD* = 1.09). Additional data concerning this curriculum area are displayed in Table 2.

Teachers also indicated that the factor *Personal Importance* had the greatest impact on their decision to teach the curriculum area of woodworking to their students (*M* = 2.98; *SD* = 0.87). However, *Administration Importance* influenced teachers the least to teach woodworking curriculum to students enrolled in Agricultural Construction 1 and/or 2 (*M* = 2.26; *SD* = 0.95). See Table 2 for additional data concerning the curriculum area of woodworking.

Conclusions

Research question one sought to describe the personal, professional, and program characteristics of school-based agricultural educators in Missouri who instruct the agricultural education course Agricultural Construction 1 and/or 2. Teachers who instruct this course, are mostly male, 37 years old, and completed a traditional teaching certification program. These teachers have about 13 years of teaching experience, earned almost 11 university semester credit hours in agricultural mechanics coursework, and teach about 94 students per semester. Furthermore, these teachers spend about 5 hours per week supervising agricultural mechanics related SAE projects.

Table 2. Factors Influencing Missouri School-Based Agriculture Teachers to Instruct Agricultural Construction 1 and/or 2 Curriculum (n = 203).

	Levels of Influence to Instruct Curriculum Areas											
	Arc Welding		Finishing		Metals		Oxy-Gas and Other Cutting/ Welding Processes		Project Construction		Woodworking	
Factors	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Administration Importance	2.41	1.10	2.12	1.09	1.95	1.06	2.24	1.04	2.57	1.09	2.26	0.95
Budget Available to Teach	2.78	1.02	2.38	1.16	2.40	1.12	2.54	1.00	2.89	1.02	2.56	0.96
Community Importance	2.84	0.87	2.34	1.06	2.15	1.00	2.71	0.95	2.96	0.98	2.42	0.96
Equipment Available to Teach	3.13	0.92	2.46	1.12	2.54	1.07	2.94	0.95	3.15	0.89	2.82	0.91
Experience in Teaching	3.15	0.90	2.59	0.99	2.50	0.98	2.96	0.99	3.15	0.88	2.73	0.99
Facilities Available to Teach	3.02	0.95	2.48	1.12	2.53	1.06	2.88	0.97	3.11	0.94	2.76	0.97
Personal Ability to Teach	3.24	0.90	2.66	0.96	2.47	1.02	2.93	0.99	3.12	0.87	2.83	1.01
Personal Importance	3.50	0.63	2.86	0.95	2.72	0.91	3.61	0.81	3.40	0.73	2.98	0.87
Personal Interest in Teaching	3.23	0.95	2.63	0.99	2.56	1.06	2.97	0.88	3.22	0.91	2.75	1.06
Student Importance	3.11	0.93	2.42	1.01	2.24	1.00	2.75	1.00	3.06	0.77	2.63	0.92

Note. Levels of Influence: 0 to 0.50 = No Influence, 0.51. to 1.50 = Little Influence, 1.51 to 2.50 = Some Influence, 2.51 to 3.50 = Moderate Influence, 3.51 to 4.00 = Great Influence

For research question two, researchers sought to identify the selected curriculum components of the agricultural education course Agricultural Construction 1 and/or 2 that school-based agricultural educators in Missouri instructed. The curriculum components that are included in this school-based agricultural education course include: arc welding, project construction, oxy-gas and other cutting/welding, woodworking, metals, and finishing. The majority of teachers indicated that they instruct all curriculum areas included in this course. However, teachers instruct the curriculum areas related to hot metal work, specifically arc welding, project construction, and oxy-gas and other cutting/welding processes, more than the curriculum areas related to woodworking, metals, and finishing.

To understand research question three, researchers sought to determine the level of influence selected factors have upon a teacher's choice to instruct various curriculum components included in the course Agricultural Construction 1 and /or 2. Teachers indicated that the factor of *Personal Importance* was the most influential factor that persuaded them to instruct each curriculum area. Furthermore, *Administration Importance* was the least influential factor that persuaded these teachers to instruct each curriculum area. The remaining factors were distributed sporadically between the most influential factor and least influential factor, and thus, no measurable pattern was established.

Discussion, Implications, & Recommendations

The Theory of Planned Behavior (Ajzen, 1991) played a major role in the development of the theoretical foundation for this study. The results of this study can be applied to this theory and conceptually worked in reverse order. If researchers can understand teachers' behavior (the decision to teach or not to teach the curriculum), future research can be conducted to determine their intention to teach (see Figure 2). According to Ajzen (1991), a teachers intention to teach is based upon four influential factors: *attitude towards the behavior,* or teaching agricultural mechanics; *the subjective norm*, or the social pressures that the administration, the community, and the students themselves, place upon the teacher to instruct the curriculum; *motivational factors*, such as the amount of personal effort, the level of intention to teach, and non-motivational factors such as budget, personal skill level, equipment available, facilities available; and *perceived behavioral control*, or the extent to which teachers believe themselves to be capable of teaching curriculum which is assumed to reflect past experience as well as anticipated impediments and obstacles. As agricultural educators, if we can unlock these factors and ensure that new teachers have positive experiences, can we then determine if teachers will choose to teach agricultural mechanics curriculum? These questions and others are grounds for future research in this subject area.

Additionally, numerous implicative questions arose from these results. Why do teachers choose to teach certain curriculum areas over others? What factors influence these teachers' decisions concerning their choice to instruct curriculum? Why is curriculum related to hot metal skills instructed more than curriculum related to woodworking, metals (cold metal skills), and finishing in Agricultural Construction 1 and/or 2 courses? Are other extraneous factors not found in this study impacting teacher's decisions to instruct agricultural mechanics curriculum? These questions and others are grounds for future studies to better understand teachers' curriculum instruction decisions. Researchers recommend future research to fully understand this phenomenon.

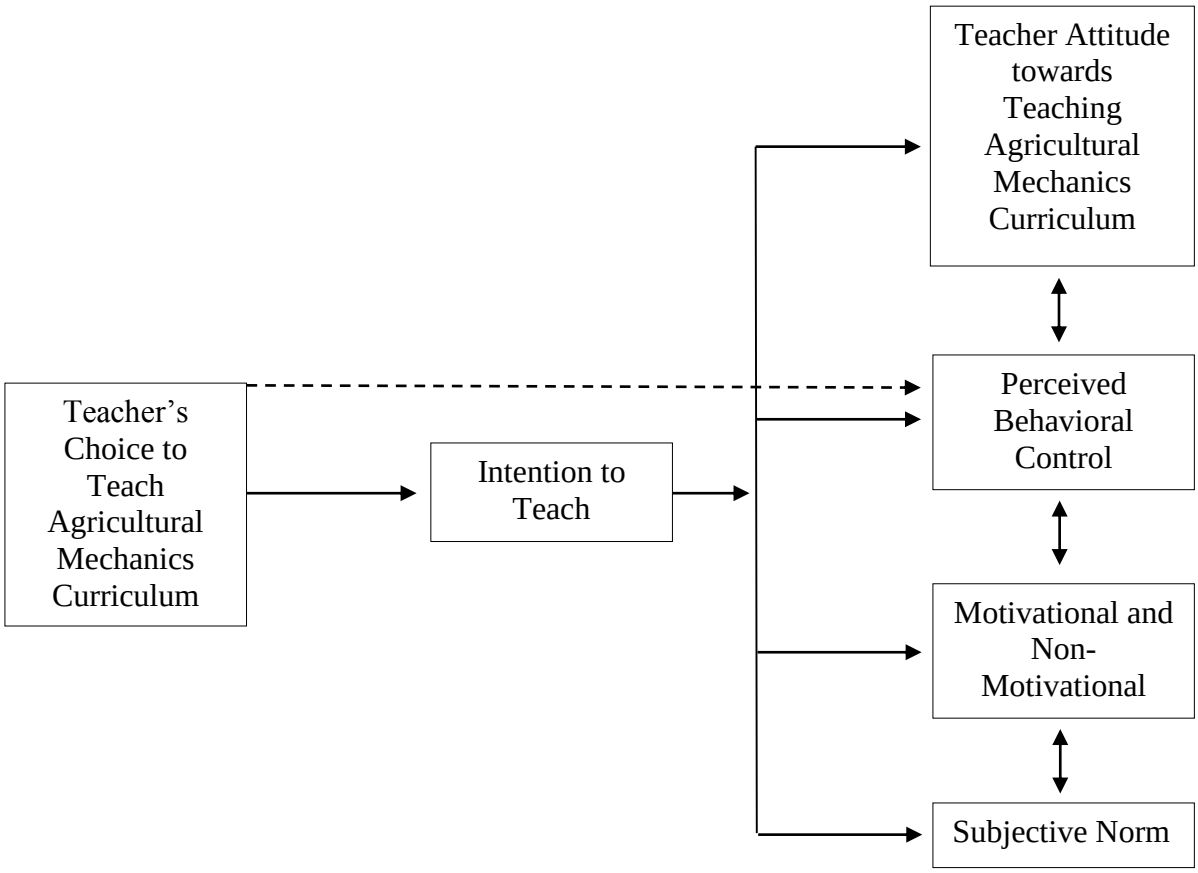

Figure 2. Conceptual Framework for Teacher's Choice to Instruct Agricultural Mechanics Curriculum (Saucier, 2010)

Several implications can be extrapolated from these results. Why does the factor *Personal Importance* play such a significant role in determining the curriculum that Missouri teachers instruct in Agricultural Construction 1 and/or 2? How is agriculture teacher's *personal importance* toward the instruction of agricultural mechanics curriculum developed? At what point during an agriculture teacher's career is their level of importance toward the instruction of agricultural mechanics curriculum developed? What factors contribute to the development of a teacher's level of importance toward the instruction of agricultural mechanics curriculum? Can a teacher's level of importance toward the instruction of agricultural mechanics curriculum be altered or improved? If so, what methods or opportunities have the potential to influence change in a teacher's level of importance toward the instruction of agricultural mechanics curriculum?

Another notable result of this study concerns the factor *Administration Importance.* For every curriculum area found within the course Agricultural Construction 1 and/or 2, teachers indicated that *Administration Importance* was the least important factor that influenced their decision to teach the various curriculum areas. Why does the factor *Administration Importance* play such an insignificant role in determining the curriculum that school-based agricultural educators in Missouri teach? The Theory of Planned Behavior (Ajzen, 1991) would suggest that *subjective norm*, i.e. the teachers' perception of the administrators' opinion, played a contributing factor in teachers' choice to instruct curriculum. However, according to the data, this was not the case. Do teachers not care about the opinion of administrators when it pertains to the instruction of

curriculum at their school? Or do administrators not have knowledge of the curriculum found within the course Agricultural Construction 1 and/or 2, and therefore, don't make an influence? These questions and others are grounds for future studies regarding curriculum choice in agricultural mechanics programs.

In the realm of education, the responsibility for teacher development is often thought to rest on the shoulders of teacher educators and the teacher development process. However, a question must be posited, does previous experience, or their lack of, aid in the development of an individual's motivation, or personal importance, to teach curriculum? To better understand this phenomenon of teacher development and a teacher's intent to teach curriculum, it is recommended that future research concerning the study of pre-service teacher curriculum experiences be conducted. Ajzen (1991) found that a teacher's intention to teach is based upon four influential factors: *attitude towards the behavior*; *the subjective norm*; *motivational factors*; and *perceived behavioral control.* These factors should be studied to determine if they impact pre-service teachers' ability to teach agricultural mechanics curriculum and to better understand and assess the professional development needs of future teachers.

As teacher educators across the nation ponder the results of this study, the quality of experiential learning activities (i.e. agricultural mechanics laboratory exercises, projects, skill acquisition challenges) to which new agricultural teachers are exposed, prior to their student teaching experience, should be examined. Are these experiential learning activities significant enough in design and rigor to promote teacher confidence and skill mastery? Additionally, what agricultural mechanics skills are being taught at these teacher education programs? Do the skills offered in these teacher education programs compare to the required skill sets needed by new teachers to excel in public schools? As teacher educators, our role is to prepare these new teachers for the challenges ahead of them in their impending careers. Ensuring adequate mastery of numerous agricultural mechanics skills can only further prepare these professionals by positively impacting their *attitude, motivation,* and *perceived behavioral control* towards teaching agricultural mechanics skills, thus reducing fears derived from the *subjective norms* of the academic and community environments.

In addition, professional development for teachers, who lack skill and pedagogical knowledge and experience to teach agricultural mechanics curriculum, should be designed, implemented, and assessed. Such programs should be offered with frequency and variety and should be delivered in formats and at times that will have the greatest impact upon the largest number of teachers. This goal could be accomplished by providing teachers with workshops offered during the winter and summer breaks, agricultural mechanics courses offered for continuing education or university graduate courses for credit. Even online, self-directed courses might be an option. Winter and summer workshops focusing on agricultural mechanics should be offered at regional locations throughout the state of Missouri and could be located at university or public school facilities.

References

Ajzen, I. (1988). *Attitude, personality, and behavior*. Chicago, IL: Dorsey Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211. doi:10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, N.J.: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

Borko, H., & Putnam, R. H. (1996). Learning to teach. In D.C. Berlinger & R.C. Calfee (Eds.), *Handbook of educational psychology* (pp. 673-708). New York: Simon, Schuster, & MacMillan.

Calderhead, J. (1996). Teachers: beliefs and knowledge. In D.C. Berlinger & R.C. Calfee (Eds.), *Handbook of educational psychology*, (pp. 709-725). New York: Simon, Schuster & MacMillian.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Doerfert, D. L. (Ed.) (2011). *National research agenda: American Association for Agricultural Education's research priority areas for 2011-2015*. Lubbock, TX: Texas Tech University, Department of Agricultural Education and Communications.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, M.A.: Addison-Wesley.

Garson, G. D. (2008, March). *Scales and Standards of Measures*. Retrieved from http://www.statisticalassociates.com/booklist.htm

Knobloch, N. A. (2001). *The influence of peer teaching and early field experience on teaching efficacy beliefs of preservice educators in agriculture*. Paper presented at the 28th National Agricultural Education Research Conference, 119-131.

Knobloch, N. A. (2008). Factors of teacher beliefs related to integrating agriculture into elementary school classrooms. *Agriculture and Human Values, 25*(4), 529-539. doi:10.1007/s10460-008-9135-z

Knobloch, N. A., & Ball, A. (2003). *An examination of elementary teachers' and agricultural literacy coordinators' beliefs related to the integration of agriculture* (Research Report). Retrieved from website: http://www.agriculturaleducation.org/clearinghouse/materialdDetail.asp?fav=y&CHID=1310

Lawrenz, F. (1985). Impact on a five week energy education program on teacher beliefs and attitudes. *School Science and Mathematics, 85*(1), 27-36. doi:10/1111/j.1949-8594.1985.tb09593.x

Missouri Department of Elementary and Secondary Education (2009). *2009-2010 Missouri Agricultural Education Directory*. Jefferson City, MO.

Moseley, C., Reinke, K., & Bookout, V. (2002). The effect of teaching outdoor environmental education on preservice teachers' attitudes toward self-efficacy and outcome expectancy. *Journal of Environmental Education, 34*(1), 9-15. doi:10.1080/00958960209603476

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw Hill.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Research in Education, 62*(3), 307-332. doi:10.3102/00346543062003307

Saucier, P. R. (2010). Level of influence of selected factors upon Missouri agricultural education teachers' choice to instruct agricultural mechanics curriculum. (Doctoral dissertation). Retrieved from https://mospace.umsystem.edu/xmlui/handle/10355/3986

Thompson, G., & Balschweid, M. (1999). Attitudes of Oregon agricultural science and technology teachers toward integrating science. *Journal of Agricultural Education, 40*(3), 21-29. doi:10.5032/jae.1999.03021

Tschannen-Moran, M., Woolfolk-Hoy, A., & Hoy, W.K. (1998). Teacher efficacy: It's meaning and measure. *Review of Educational Research, 68*(2), 202-248. doi:10.2307/1170754