Research

Effective Practices in STEM Integration: Describing Teacher Perceptions and Instructional Method Use

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Effective Teaching: Agriculture Teachers' Confidence in Instructional Method Use and Perceived Effectiveness

Introduction/Need for Research

Researchers have concluded that teacher selection of instructional methods is one of most significant variables influencing student learning and retention (Marzano, Pickering & Pollock, 2001; Reigeluth, 2013). Understanding teacher use of instructional methods is in line with research priority four of the American Association of Agricultural Education (AAAE) to "create a meaningful learning experience for students enrolled in secondary agriculture courses" (Doerfert, 2011).

Although instructional method effectiveness has been examined related to student performance in agricultural education (Dyer & Osbourne, 1996; Parr & Edwards, 2004; Thoron & Myers, 2012), an apparent gap existed related to knowing if agriculture teachers feel confident using methods they believe are most effective in secondary agriculture courses. This research is a portion of a larger study focused on describing the methods agriculture teachers are using in the classroom. This portion of the study was developed determine if a relationship existed between teacher confidence in using a method and their perceived effectiveness of the method.

Theoretical Framework

This study was grounded in Bandura's (1986) social cognitive theory. According to Bandura (1986), human actions are a function of the dynamic interaction between personal, behavioral, and environmental determinants. Teacher selection of instructional methods can be examined through social cognitive theory; as selection is based on personal, environmental, and behavioral characteristics. Teachers have a personal factors which could lead to their selection of instructional methods, including perception of instructional method effectiveness and self-efficacy. Instructional method selection is also influenced by teacher behavioral characteristics and the classroom environment they are operating in. This portion of the study focused solely on the interaction between the personal determinants of perceived effectiveness and self-efficacy (Bandura, 1997) when using a particular instructional method.

Methods

The objective of this study was accomplished through descriptive survey methods. The agriculture teachers in three states (N = 1049), one state from each of the AAAE regions, served as the purposively selected population for this research. A stratified random sample of n = 280 agriculture teachers ([State] (n = 135), [State] (n = 112), and [State] (n = 33)) were selected from the population, invited to complete the instrument, and take part in the research study. Respondents completed an online, researcher developed instrument which allowed respondents to ranked both their preference for and confidence in using ten instructional methods described by Newcomb, McCracken, Warmbrod, and Whittington (2004).

The instrument was evaluated by a group of experts for content and face validity and piloted to similar regionally stratified sample to establish reliability, which was calculated for

scaled items at $\alpha = 0.73$. Tailored-method design (Dillman, Smyth, & Christian, 2009) procedures were followed to maximize potential response rate. From the sample, 127 useable responses were collected, for a 45.4% response rate. To ensure that no single state had an uneven influence, responses were compared between states using a Chi Square test. Results indicated that there were no differences by state, supporting the decision that no state had a weighted influence on findings. To control for non-response error, early ($n = 44$) and late ($n = 81$) responders were compared (Linder, Murphy, & Briers 2001) with no significant differences found.

Data were analyzed using IBM™ SPSS® Version 20. Data analysis employed Spearman rank order correlation to investigate the relationship between teacher confidence in using an instructional method and their perception of method effectiveness.

Results/Findings

Using Davis (1971) for strength of association, teacher confidence in instructional methods were moderately or substantially correlated to perceived effectiveness of the methods for each of the ten instructional methods included in the instrument. Independent study was the only instructional method with a substantial correlation, having a coefficient value of $r_s = 0.54$. Correlation coefficient values were moderate (0.30 - 0.49) for the other eight instructional methods, including role playing ($r_s = 0.44$), field trips ($r_s = 0.42$), lecture ($r_s = 0.40$), cooperative learning ($r_s = 0.40$), guest speakers ($r_s = 0.40$), experiments ($r_s = 0.39$), supervised study ($r_s = 0.37$), discussion ($r_s = 0.34$), and demonstration ($r_s = 0.32$).

Conclusions, Implications, Recommendations

Results of this study highlight that there was at least a moderate relationship between agriculture teacher instructional method confidence and perceived effectiveness respondents. Although this research shows relationship, it is unknown if teachers are more confident using the methods they feel are most effective, or if they are consciously making the choice to increase their use and become confident in methods which have been shown to be most effective. Further research is recommended to examine the causes for the relationship and its effect on teacher use of instructional methods. It is also suggested to conduct experimental research related to which instructional methods, or combinations of instructional methods are most effective at increasing student performance. With knowledge of instructional method effectiveness, steps can be taken to examine methods for increasing teacher confidence in using effective methods.

Understanding teacher confidence and perceived effectiveness for instructional methods is a first step in creating agricultural educators who are confident in using methods that will have the greatest impact on student learning. It is comforting to know that across the board, respondents felt they were making instructional method decisions that will effectuate learning in their students. These results have implications for agricultural educators who make daily decisions as to which methods should be used to deliver content. This study also lends evidence to teacher educators and suggests that agricultural educators may be willing to integrate instructional methods which are found to be most effective in the classroom, if enough support is given to help them feel confident using the method.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall, Inc.

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

Davis, J. A. (1971). *Elementary survey analysis*. Englewood Cliffs, NJ: Prentice–Hall.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method*. Hoboken, NJ: John Wiley & Sons, Inc.

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.

Dyer, J. E., & Osbourne, E. W. (1996). Effects of teaching approach on achievement of agricultural education students with varying learning styles. *Journal of Agricultural Education*, *37*(3), 43-51. doi: 10.5032/jae.1996.03043

Linder, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, *42*(4), 43-53. doi: 10.5032/jae.2001.04043

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: ASCD.

Newcomb, L. H., McCracken, J. D., Warmbrod, J. R., & Whittington, M. S. (2004). *Methods of teaching agriculture*. Upper Saddle River, NJ: Pearson Prentice Hall.

Parr, B., & Edwards, M. C. (2004). Inquiry-based instruction in secondary agricultural education: Problem-solving-An old friend revisited. *Journal of Agricultural Education*, *45*, 106-117. doi: 10.5032/jae.2008.02027

Reigeluth, C. M. (Ed.). (2013). *Instructional design theories and models: An overview of their current status*. London: Routledge.

Thoron, A. C., & Burleson, S. E. (2014). Students' Perceptions of Agriscience when Taught Through Inquiry-Based Instruction. *Journal of Agricultural Education*,*55*(1), 66-75. doi: 10.5032/jae.2014.01066

Thoron, A. C., & Myers, B. E. (2012). Effects of Inquiry–based Agriscience Instruction and Subject Matter–based Instruction on Student Argumentation Skills. *Journal of Agricultural Education*, *53*(2), 58-69. doi: 10.5032/jae.2012.02058