DEVELOPING LEARNER AUTONOMY BY LINKING CLASSROOM THEORY TO APPLIED RESEARCH

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INTRODUCTION

Autonomous learning can be defined as the process of taking charge of one's learning (Holec, 1980). The ability for students to "self educate," allowing the learner to become more responsible for the learning process, becomes extremely important in applied areas of education, including agriculture (Hiemstra, 1994). A major challenge to this approach is developing curriculum to foster the idea of autonomous learning. Agriculture education at secondary and collegiate levels is deficient in autonomous learning research. The potency of agriculture relies heavily on education at these levels to maintain a continued source of properly trained and qualified individuals for employment in the agriculture industry. The rapid advancement of the agriculture industry, in conjunction with the lack of autonomous learning research in agriculture education, calls for exploration in the use of autonomous learning techniques in applied science curriculum.

There are three main objectives of this research. The first is to evaluate if successful autonomy can be achieved when students are afforded a "facilitated" opportunity to link classroom theory with applied research to further the comprehension of often complex subject matter. The second was to determine if providing students the opportunity to be trained evaluators of quality measurements for food animal products links the theory and practice of animal food product quality evaluation to real-life scenarios. The third was to establish a practical autonomous learning model to utilize within food animal curriculum design. Given the objectives of this study, we hypothesized that the effect of student treatment (evaluator vs. non-evaluator) would significantly influence the mean difference between the pre-test and post-test scores. It was also proposed that a significant relationship exists between the subjective student analysis and the objective instrument analysis of the fresh pork loins.

METHODS

Illinois State University undergraduate students in AGR 271 Foods of Animal Origins and AGR 285 Introductory to Meat Science classes voluntarily participated in an experiment involving the visual appraisal of fresh pork loins treated with natural antioxidants. A total of forty-six students from both classes were randomly divided into two treatment groups, half as panelists and half as control. The control group received only in-class information on meat quality, while the panelists received both in-class and hands-on experience. Both treatment and control groups completed a pre test, and demographic survey to generalize population characteristics and prior knowledge of meat purchasing experience. The treatment group of panelists completed a lab involving subjective analysis of pork loins treated with antioxidants at specified days of refrigerated shelf storage. Using anchored-line Likert scale evaluations, the panelists measured color, firmness, and marbling for each sample for each day of evaluation. The samples were then objectively evaluated with a spectrophotometer, quantifying quality changes during storage. On each evaluation day, the panelists completed open-ended questions requesting preferences and justifications on which samples they would purchase as consumers. Both the control and treatment and groups completed a post-test following the meat quality portion of the class.

Statistical quantitative analysis of the data was conducted using a one-way analysis of variance model with fixed effects in SAS/STAT® software to determine if the fixed effect of treatment (evaluator vs. non-evaluator) influenced the mean difference between the pre-test and post-test scores. In the event of finding significant differences between treatment groups, a multiple comparisons follow-up test using least significant differences was conducted. Pearson correlation coefficients were estimated for the linear relationships between the student's subjective evaluations and the objective instrument measurements. A student demographic survey was conducted to establish background on the type of students involved in this study.

RESULTS

Data from this experiment suggests that there is no effect of treatment on pre-test ($P = 0.61$), post-test ($P = 0.30$), or the difference between pre-test and post-test scores ($P = 0.28$). The analysis of variance results indicated that belonging to a particular treatment group (control or evaluator) had no effect on the scores of the pre-test, post-test, or the difference between the pre-test and post test. The Pearson Correlation Coefficient indicated five significant relationships between the subjective and objective analysis of the pork loins at $P < 01$. A negative correlation between the objective lightness variable and the subjective variable for lightness was

-0.526, suggesting that as the objective value for lightness increase, the subjective analysis for lightness decreases. A negative correlation between the objective lightness variable and the subjective variable for redness was -0.512, indicating that as the objective value for lightness increases, the subjective value for redness decreases. A positive correlation between the objective red vs. green variable and the subjective lightness variable was 0.379, suggesting that as the objective values for redness increases, the subjective values for lightness increase. A positive correlation between the red vs. green objective variable and the subjective redness variable was found 0.369, indicating that as the objective value for redness increases the subjective value for lightness also increases. A negative correlation between the objective variable red vs. green and the subjective value for marbling was -0.196, suggesting that as the objective variable for redness increases, the subjective value for marbling decreases.

DISCUSSION

Results indicated no significant effect of treatment group on test scores, but did demonstrate five significant relationships between the student's subjective analysis and the objective analysis on pork loins. We can not conclude that the effect of treatment explains the variation between test scores more than the residual variation, which in this example, could be from the variation in pork loins. Significant correlations coincide with the experimental design, indicating the students were successfully able to evaluate quality within those areas, thus linking the lab and lecture material to practical consumer situations. However, the strength of these correlations likely limits the practical ability of students to sort quality attributes without additional experience. Due to limitations and alterations to the initial design, the sample size was smaller than previously proposed, suggesting rationale for the lack of significance within the analysis of variance and limited correlations. While we could not suggest that completing this lab fosters autonomy, we can theoretically expect that given the nature of the laboratory, hands on training will promote this ideal within and beyond the collegiate level. Therefore, we have developed a practical autonomous learning model for use in food animal science curriculum, facilitating the opportunity for students to link classroom theory of subject matter to other curriculum and real life situations.

CONCLUSION

This research becomes extremely useful in applied science curriculum, where laboratories are designed to provide hands on experience by developing autonomous learning characteristics. Even though the statistical conclusion did not suggest that the laboratory enhanced the comprehension of the subject matter, the theoretical concept of the activity can be used as a pragmatic approach to assist lecture material. Given the importance of this type of research, future studies involving food animal curriculum can utilize this approach expanding to cover multiple classes, or increasing the number of students within each treatment group. Also, including a follow-up study on the treatment groups one year after completing the experiment will give more tools for measuring if the information was comprehended, thus if autonomous learning was achieved.

References

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