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"Clickers" and HACCP: Educating a Diverse Food Industry Audience with Technology

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Abstract

Hazard Analysis Critical Control Points (HACCP) is a systematic approach to food safety education for the food industry. To receive a HACCP certificate, participants must receive an 80% or higher on the final examination. Language barriers, educational levels, and age have been noted as primary reasoning's for not passing the final examination. Clicker technology has been shown to improve knowledge transfer to students in various classroom settings. Incorporation of mock final examination questions using Clickers into a traditional HACCP course has been shown in a small pilot study to increase the pass rate.

Disciplines

Food Science | Higher Education | Human and Clinical Nutrition | International and Community Nutrition | Molecular, Genetic, and Biochemical Nutrition

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HACCP

Hazard Analysis Critical Control Points (HACCP) is a systematic approach to food safety education for the food industry by the National Advisory Committee on Microbiological Criteria for Foods (NACMCF, 1998). While NACMCF does not have a standardized curriculum, the International HACCP Alliance through Texas A&M University, requires all curriculum material be approved by an expert panel prior to use in a certificate based HACCP course (Wallace & Powell, 2005). At the conclusion of the HACCP course, the participants must take a standardized test and receive a grade higher than 80% for certification. Train-the-trainer programs and incorporation of HACCP into the higher education classroom is a common practice throughout the United States (Martin, Knabel, & Mendenhall, 1999; Lo, Fukushima, Rippen, Gdovin, & Hahm, 2004). Over the past seven years, it has been observed that the population that struggled to pass the standardized test was represented by those who do not speak English as a first language and the non-traditional aged participants (over age of 35).

Food Industry Worker Population

Ethnic minorities make up about 29% of the U.S. population with the largest employer to these minorities being the food industry (Multicultural Foodservice & Hospitality Alliance, 2005). Additionally, in the U.S. the two most commonly spoken languages are English and Spanish but there are over 364 other languages spoken in the U.S (Lewis, 2009). The Bureau of Labor Statistics reports that the majority of food industry employees have less than a high school diploma, change jobs frequently, and have a median age of 41.2 years (United State Department of Labor, 2015). There have been many research projects focused on how to educate such a diverse audience within foodservice workplace (Canziani, 2006; Madera, Neal & Dawson, 2011, Niode, Bruhn, & Simmone, 2010). Within extension programs, this can be extremely difficult to educate such a diverse clientele.

Clickers

Clickers technology has been shown to be an excellent tool for Extension audiences that have different educational levels and life experiences (Bird & McClelland, 2010). Clickers have also been shown to be effective at increasing knowledge in audiences with varying income levels, educational levels, and language as barriers (Ginter, Maring, Paleg, & Valluri, 2013; Waltz, Maniccia, Bryde, Murphy, Harris, & Waldenmaier, 2010). Another noted benefit of Clickers is the anonymity that they provide the participants and the ability to facilitate discussion without targeting a group of individuals (Gustafson & Crane, 2005).

Methods

Short Course Layout

HACCP is taught over two 8 hour days at which a standardized 20 question test is provided at the end. The course is a combination of PowerPoint lectures by food safety Extension faculty and working group activities to learn how to develop a HACCP plan. The PowerPoint lectures are approved by the International HACCP Alliance and provide the background information on how to make decisions while developing a HACCP plan. The lectures range from 45 minutes to 1 hour in length. The working groups are comprised of five participants and a HACCP certified instructor guide. Each group is assigned a different product, and through five working group activities they learn the seven principles of HACCP. Each working group activity is 1 to 2 hours in length. After each working group session, the teams report back to the entire class and the food safety extension specialist provides them with feedback.

Incorporating Clickers into Short Course

At the conclusion of each PowerPoint lecture, five multiple choice questions are asked of the participants using the Clickers technology. The five multiple choice questions are taken from the material taught in the prior lecture. The five questions for each PowerPoint lecture were validated by a four food safety faculty members from Iowa State University. The questions mimic the format and language use of the final examination questions, but none of the final examination questions are provided in the Clickers questions.

After each question is posed to the class through Clickers, the anonymous results are displayed, and the correct answer is indicated. The instructor provides reasoning for why this is best answer to the question and provides an opportunity for the participants to ask follow up questions. For future programming preparation, at the conclusion of each of the classes, the answers to the mock questions are saved to determine trends of topics that need to be explained or more attention during instruction.

Table 1.

Ten Examples of Clickers Questions Incorporated into the HACCP Short Courses

	Question
1	HACCP is… A. Hazard Analysis Constant Control Program B. Hazard Analysis Critical Control Point C. Hazard Analysis Consumer Confidence Program D. Hazard Awareness Critical Control Program
2	What is NOT a type of potential food hazard category? A. Biological B. Quality C. Chemical D. Physical
3	Which of these is not an initial step in Developing HACCP? A. Assemble HACCP Team B. Describe the Food and Its Distribution C. Develop a Flow Diagram D. All of these are steps
4	A CCP is any step at which biological, chemical, or physical factors can be controlled. A. True B. False

5	Allergens are considered a biological hazard A. True B. False
6	Critical limits can be based on average values A. True B. False
7	Corrective action should A. Determine and correct the cause of non-compliance; B. Determine disposition of non-compliant product; C. Record the corrective actions that have been taken. D. All of the above
8	Record keeping is HACCP Principle 5 A. True B. False
9	Validation are activities that determine you are carrying out your HACCP plan as designed A. True B. False
10	Monitoring procedures are: A. Measurements to assess whether a CCP is in control B. A quality verification procedure C. A and B D. None of the above

Piloting of Concept

This concept was challenged in three HACCP courses between 2013-2015 (N=72), where 30% of the population indicated English as the second language, 62% indicated less than a high school level education, and the median age of participants was 38. The pass rate for these three classes was 99.3% (98%, 100%, 100%), which was an increase of 3% from previous courses where first attempt pass rate were 96% (N=205). Participants indicated in the short course evaluations that the Clickers kept them alert (N=43) and exposed them to the type of questions asked on the final exam (N=36). Other participants indicated that the Clickers technology assisted with the language barrier (N=18) and knowing how to determine the best answers (N=26).

Summary

ISU food safety team goal is to ensure knowledge is transferred to every participant who attends their HACCP short course. The use of Clickers within the course was proven through the pilot study to be an effective tool to improve pass rates in HACCP short courses with a diverse audience.

References

Bird, C., & McClelland, J. (2010). Have you used clickers in programming?. *Journal of Extension* [On-line], 48(5) Article 5TOT9. Available at: http://www.joe.org/joe/2010october/tt9.php

Canziani, B.F. (2006). Managing language policies in the foodservice workplace: A review of law and EEOC guidelines. *Journal Foodservice Business Restaurants* , 9, 27–47.

Ginter, A. C., Maring, E. F., Paleg, B., & Valluri, S. (2013). Using clicker technology with rural, low income mothers: Collecting sensitive data anonymously, *Journal of Extension* [On-line], 51 (4) Article 4FEA3. Available at: http://www.joe.org/joe/2013august/a3.php

Gustafson, C., & Crane, L. (2005). Polling your audience with wireless technology, *Journal of Extension* [On-line], 43(1) Article 6TOT3. Available at:
http://www.joe.org/joe/2005december/tt3.php

Lantz, M. E. (2010). The use of 'clickers' in the classroom: Teaching innovation or amusing novelty?. *Computers in Human Behavior*, 26(4), 556-561.

Lewis, P. M. (2009). *Ethnologue: Languages of the world*, 16th edition. SIL International Publications: Dallas, TX

Lo, T. M., Fukushima, K., Rippen, T. E., Gdovin, S. L., & Hahm, T. (2004). Active assessment for HACCP training: Integrating pedagogical reasoning with primary trait analysis. *Journal of Extension* [On-line], 42 (6) Article 6AIW4. Available at: http://www.joe.org/joe/2004december/iw4.php

Madera, J.M., Neal, J.A. & Dawson, M. 2011. Strategies for diversity training: Focusing on empathy in the workplace. *Journal of Hospitality Tourism Research*, 35, 469–487.

Marin, K., Knabel, S., & Mendenhall, V. (1999). A model train-the-trainer program for HACCP based Food Safety Training in the retail/Food Service Industry: An evaluation. *Journal of Extension* [On-line], 37 (3) Article 3FEA1. Available at: http://www.joe.org/joe/1999june/a1.php

Multicultural Foodservice & Hospitality Alliance. (2004). Multiculturalism in the food and hospitality industry. Retrieved from: http://www.mfha.net/files/publications/fastfacts_download.pdf

NACMCF (1998). Hazard analysis and critical control point principles and application guidelines. National Advisory Committee on the Microbiological Criteria for Foods. *Journal of Food Protection*, 61, 1246-1259.

Niode, O., Bruhn, C., & Simmone, A.H. (2010). Insight into Asian and Hispanic restaurant manager needs for safe food handling. *Food Control*, 22, 34–42.

Wallace, C. A., & Powell, S. C. (2005). Post-training assessment of HACCP knowledge: its use as a predictor of effective HACCP development, implementation and maintenance in food manufacturing. *British Food Journal*, 107, 743-759.

Waltz, E. C., Maniccia, D. M., Bryde, R. L., Murphy, K., Harris, B. R., & Waldenmaier, M. N. (2010). Training the public health workforce from Albany to Zambia: Technology lessons learned along the way. *Public Health Reports , 125*, 61-89. Retrieved from: http://www.publichealthreports.org/issueopen.cfm?articleID=2535

United States Department of Labor. (2015). Occupational Outlook Handbook: Food and beverage serving and related workers. *Bureau of Labor Statistics*. Retrieved from: http://www.bls.gov/ooh/food-preparation-and-serving/food-and-beverage-serving-and-related-workers.htm