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[Return to Current Issue](#)

Assessment of Native Languages for Food Safety Training Programs for Meat Industry Employees

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Abstract: Challenges arise when teaching food safety to culturally diverse employees working in meatpacking and food manufacturing industries. A food safety training program was developed in English,

translated into Spanish, and administered to 1,265 adult learners. Assessments were conducted by comparing scores before and immediately following training. Scores concerning food safety knowledge and food handling behavior improved dramatically when training was conducted in the native language. Impressive gains were noted for Spanish-speaking participants who averaged 96.60% on post-training scores, demonstrating that identical food safety training programs are most successful with both English- and Spanish-speaking individuals when presented in their native languages.

Introduction

Recognizing that the numbers of non-English speaking laborers employed in meatpacking and food manufacturing industries will continue to grow (Po, Bourquin, Occeña, & Po, 2011), it is evident that these individuals must learn safe food handling behaviors and methods. The study reported here examined the extent to which a food safety training program developed in the English language and taught to English-speaking individuals would be as effective when translated into the Spanish language and taught to Spanish-speaking individuals in their native language.

Recently updated information has shown that foodborne diseases caused by known and unknown pathogens total 47.8 million illnesses, 127,839 hospitalizations, and 3,037 deaths annually in the United States (Scallan et al., 2011). While much of the responsibility for preventing foodborne illnesses and deaths lies in safe food handling in the home (Marsden, 2009), the food processing industry bears major responsibility for ensuring safety of commercially available food products, and employee training in food safety is a critical element in meeting that responsibility.

The meatpacking industry in the United States relies heavily upon non-domestic workers who are typically non-English speaking individuals. From 1980 to 2000, non-Hispanic Caucasian employees in meatpacking plants decreased from 74 to 49%, whereas the Hispanic workforce increased from 9 to 29%. In this same time span, the number of Hispanics born outside of the United States and entering this work force increased from 50 to 82% of the Hispanic group. With this rapid influx of non-English speaking persons into the food processing sector, instruction and training in proper food handling have become especially problematic (Kandel, 2006).

Although food processors continue to develop and improve methods of safe food production (Jol, Kassianenko, Oggel, & Wszol, 2006), proper food handling techniques can be difficult to teach to individuals when native language is not used, such as for Spanish-speaking laborers in an English-speaking work environment (Nyachuba, 2008). Employee training programs must emphasize the importance of safe food, implement effective manufacturing practices, and enforce standard operating procedures in the plants so as to provide safe and wholesome products (Mikel, White, & Senne, 2002). These programs must be designed using proven educational methods and meet the needs of the diverse cultures comprising the work force of these plants. Attention must be given to the communication skills and educational levels of all employees, including the growing non-English speaking population employed in these industries. A food safety curriculum designed to teach bilingual youth has been shown to provide successful training when the material was translated to the Spanish language (Hoover, Cooper, Tamplin, Osmond, & Edgell, 1996).

Methods

Company trainers, Extension specialists, and university personnel devoted significant time in a series of planning meetings for the development of pre-employment food safety training programs that were taught in both English and Spanish languages for a major Midwest meat processing company. The program

curriculum was developed based on a food safety handbook written by a nationally recognized corporation that provided program modules on allergens, bacteria, cross-contamination, foodborne illness, foreign material detection, personal hygiene, pest control, sanitation, security, and time and temperature. Six videos addressing cross-contamination, foodborne illnesses, microorganisms, personal hygiene, and sanitation were utilized for instruction. Individuals participated in activities that taught proper handwashing methods and differences that exist between poisons and sanitizers. Weekly training sessions were taught in a classroom at a plant on two mornings in succession. At the conclusion of the training, individuals considering employment were required to achieve a 70% score on a 65-question multiple-choice certification exam that measured their comprehension of the material. The exam questions were taken from quizzes included in the food safety handbook.

A confidentiality statement was provided to the participants immediately prior to the training, and demographic information was collected: age, education, native language, gender, years of food service experience, and whether the participant was a re-hire for the company. To assess comprehension of the information, two documents (a pre-training assessment and a post-training assessment) were developed using 20 multiple-choice questions from the certification exam, focusing on both knowledge and behavior. Both documents were comprised of the same questions, although the questions were randomized in each document. All training and assessments were done in English for English-speaking participants and in Spanish for Spanish-speaking participants. Both versions of training and assessment were written with careful attention to likely literacy levels that might be encountered. Data was analyzed using the General Linear Model (GLM) procedure with contrasts (SAS, version 9.1; SAS Institute, Incorporated, Cary, North Carolina). $P < 0.05$ was the standard for significance.

The knowledge questions included the following.

- Ways to control bacteria in food include:
- Which bacteria can be controlled by time and temperature?
- The temperature "Danger Zone" is between:
- Disease caused by harmful bacteria in food is called:
- The most important personal hygiene practice to control the spread of bacteria is:
- Which control measures help prevent foreign materials from getting into food?
- Bacteria can cross contaminate food by hitching a ride on:
- Sanitation refers to:
- Pests are attracted to:
- Bacteria are found in:

The behavior questions included the following.

- If you think a time or temperature control may have been violated:
- To prevent chemical cross contamination always:

- To prevent bacterial cross contamination always:
- When wearing personal protective equipment (PPE) you should:
- Good personal hygiene practices include:
- When working with foods that contain allergens:
- Which is **not** a good personal hygiene practice?
- Visual inspection means:
- To make sure time and temperature controls are met:
- You must always wash your hands after:

Results

Demographics of the 1,265 participants that completed both the pre- and post-training assessments are shown in Table 1.

Table 1.
Demographic Information of Participants Completing Food Safety Pre- and Post-
Training Assessments

| Variable | Percent |
|-----------------------------|----------------|
| Gender | |
| Male | 58.81 |
| Female | 41.19 |
| | |
| Native Language | |
| Spanish | 20.79 |
| English | 79.21 |
| | |
| Reported Age (Years) | |
| Younger Than 20 | 9.43 |
| 20-29 | 42.66 |
| 30-39 | 26.12 |
| 40-49 | 16.07 |
| Equal To or Greater Than 50 | 5.72 |
| | |

| | |
|---|-------|
| Education-English | |
| 11th Grade or Less | 11.10 |
| High School Diploma/General Education Development (GED) Certificate | 51.10 |
| Some College/ Vocational Technical Courses | 23.90 |
| Vocational Technical Certificate | 5.10 |
| Associate or Advanced Degree | 8.50 |
| No Response | 0.30 |
| | |
| Education-Spanish | |
| Grades 1-6 | 34.99 |
| Grades 7-9 | 31.94 |
| Grades 10-12 | 19.77 |
| Some College/ Vocational Technical Courses | 4.18 |
| College/ Vocational Technical Certificate | 2.28 |
| No Response | 6.84 |
| | |
| Food Service Experience (Years) | |
| None | 22.92 |
| Less Than 1 | 20.16 |
| 1-5 | 38.18 |
| Greater Than 5 | 17.08 |
| No Response | 1.66 |
| | |
| Re-hire for the Company | |
| Yes | 7.83 |
| No | 88.38 |
| Current Employee | 1.50 |
| No Response | 2.29 |

Table 2 contains results from pre- and post-training assessments for knowledge and behavior questions.

Table 2.
Comparisons of Scores Food Safety Pre- and Post-Training Assessments

| Variable | Mean (SD) Pre-training | Mean (SD) Post-training |
|--|-----------------------------------|------------------------------------|
| Knowledge Questions | | |
| <i>Native Language</i> | | |
| Spanish | 42.67 a (27.5) | 93.23 b (19.4) |
| English | 83.50 a (17.0) | 96.88 b (13.3) |
| Total | 74.21 a (26.2) | 96.05 b (15.0) |
| | | |
| Behavior Questions | | |
| <i>Native Language</i> | | |
| Spanish | 58.61 a (29.7) | 93.17 b (19.5) |
| English | 91.41 a (15.5) | 97.20 b (13.3) |
| Total | 83.95 a (23.9) | 96.28 b (15.0) |
| | | |
| All Questions | | |
| <i>Native Language</i> | | |
| Spanish | 55.61 a (22.7) | 96.60 b (6.4) |
| English | 88.46 a (12.1) | 98.68 b (3.5) |
| Total | 81.63 a (20.0) | 98.25 b (4.3) |
| a, b means within a row with different superscripts are significantly different (P< 0.05) | | |

For knowledge questions, the Spanish-speaking group significantly ($P<0.05$) improved their mean scores by 50.56 percentage points, compared to an improvement of 13.38 percentage points ($P<0.05$) for the English-speaking group. Initially, the English-speaking group had a mean score of 83.5%, and the Spanish-speaking group had a mean score of 42.67%. The post-training assessments showed the mean scores of the Spanish-speaking group (93.23%) were within 3.65 percentage points of the mean scores of the English-speaking group (96.88%).

For behavior questions, the Spanish-speaking group also improved their mean scores significantly ($P<0.05$) by 34.56 percentage points, compared to an improvement of 5.79 percentage points for the English-speaking group. On the pre-training assessments, the English-speaking group had a mean score of 91.41%, and the Spanish-speaking group had a mean score of 58.61%. The post-training assessments showed the mean scores of the Spanish-speaking group (93.17%) were within 4.03 percentage points of the mean scores of the English-speaking group (97.20%).

A review of the mean scores for all questions provides revealing information. The English-speaking group achieved a mean score of 88.46% on the pre-training assessment, while the Spanish-speaking group mean score was 55.61%. The English-speaking group had a mean score that was 32.85 percentage points higher on the pre-training assessment.

However, the English-speaking group achieved a mean score of 98.68% on the post-training assessment, while the Spanish-speaking group achieved a mean score of 96.60%. Following the training program, the Spanish-speaking group had a mean score that was only 2.08 percentage points lower on the post-training assessment.

The high initial scores by the English-speaking group may reflect a greater familiarity with food safety issues among the English-speaking participants due to media coverage of these issues in the United States.

Impressive improvement was made by the Spanish-speaking group by training in the Spanish language. They increased their overall mean score 40.99 percentage points when pre- and post-training assessment scores were compared (compared to 10.22 percentage point improvement for the English-speaking group).

Discussion and Recommendations

Because of the importance of manufacturing safe products, food safety training programs must be taught to all employees in food manufacturing and meat processing plants. Rennie (1994) evaluated employee food hygiene education courses taught in food manufacturing industries and concluded that the most effective training sessions were held at the worksites. It should be noted that the training principles and techniques employed in the study reported here have much broader potential application than the meat and food industry. With the influx of non-English speaking laborers into the English-speaking workforce of many industries, the results of the study have application to virtually any industry and any non-English language.

Extension specialists and trainers must communicate with the Hispanic population by using bilingual aides and Spanish-speaking educators and present materials in English and Spanish to be most effective (Farner, Cutz, Farner, Seibold, & Abuchar, 2006). Results of the present study indicate that food safety training programs translated to the Spanish language and taught to adult Spanish-speaking learners were highly effective. The study addressed adult learner issues as follows: identify needs, define objectives, identify learning experiences to meet objectives, organize learning experiences into plans, and evaluate program outcomes (Brookfield, 1986).

Significant increases in food safety knowledge and an understanding of proper food handling behavior by the Spanish-speaking group was realized as a result of this training. The improvements in scores are even more impressive when reviewing the educational levels of both groups—66.93% of the Spanish-speaking group had completed grade 9 or less in their education; 88.90% of the English-speaking group had earned their high school diploma/GED certificate or more in their education. This confirms that the curriculum has been designed to effectively reach the participants on a level that they are capable of comprehending. In addition, because that material was translated into the Spanish language, individuals were effectively taught the proper procedures and behaviors to implement when handling food and meat products. The program and materials developed during the course of the study are now being used in a large-scale training program by a major meat processing firm.

Food and meat recalls are serious matters. Not only could consumers be placed into potentially dangerous situations, recalls are expensive and can drive companies out of business as a result of losing public trust. Successful food safety training that utilizes successful adult learning methods and accommodates differences in language and education will help to ensure that all safety measures are being used by employees to manufacture safe, wholesome food and meat products. Curriculum development, teaching,

and assessing food safety training programs for plant employees in their native languages should be initiated and continued. Trainers should be cognizant of differing levels of education as this may directly affect how well these adults learn. In the study reported here, individuals were taught about safe food handling and proper behaviors to use when handling food. Distinct differences exist between knowing about proper safe food handling and actually developing new habits that implement those practices in the manufacture of safe food and meat products. Production line cameras and monitoring the use of soap dispensers are two examples that may be valuable to ensure that a food safety culture has been achieved.

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