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Effectiveness Of Visual-Based Safety Training Compared With Non-Visual Based Safety Training In The Meat Processing Industry For Non-English Speaking, Hispanic Employees

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EFFECTIVENESS OF VISUAL-BASED SAFETY TRAINING COMPARED WITH NON-VISUAL BASED SAFETY TRAINING IN THE MEAT PROCESSING INDUSTRY FOR NON-ENGLISH SPEAKING, HISPANIC EMPLOYEES

By

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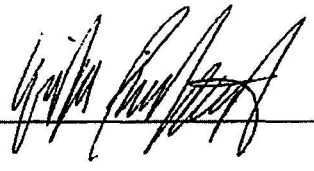
Signature 

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DEDICATION

This thesis is dedicated to my children, Henry and Riley,
for giving me the motivation I needed to complete this endeavor.

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ABSTRACT

The purpose of this research was to identify whether visual-based safety training for non-English, Spanish speaking employees in the meat industry is more effective than non-visual training. The literature review included in this thesis studies the known barriers to training, the existing training methods out there for safety training, and the best forms of safety training for non-English, Spanish speaking workers.

The methodology in this research evaluated the effectiveness of visual-based training versus a non-visual training for non-English, Spanish speaking employees in the meat industry. Two training sessions with a total of 30 volunteers was organized in order to evaluate which method would be more effective. One group was presented with a visual-based training while the other group received the exact same information read out loud with no visuals to accompany. Each participant was given the same 15 question quiz at the end of their session to find if one group retained more information than the other.

The results of this study did find an observational difference in quiz results between the two groups, showing the group with the visual-based training performed better, but there was no statistically significant difference between the two. However, further discussion finds that education level of participants and the small sample size could be a negative factor. The results do open up the opportunity for further research.

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CHAPTER I

INTRODUCTION

In the last two decades, the United States has experienced one of the largest waves of immigration ever seen with some 900,000 foreigners immigrating to the United States each year; most of whom are Hispanic and many of whom have come into the United States looking for work (Brunette, 2004; Hutchings, Loayza, Christofferson, & Burr, 2012). As of 2009, estimates calculated that there were more than 12 million undocumented aliens in the United States and Hispanics made up a large part of that group, as they were the fastest growing ethnic group in the United States as of 2004 (Brunette, 2004; Smith, Currie & Hancock, 2009). These numbers are represented throughout the workforce as well. As of 1980, Hispanics made up 5.9 percent of the United States workforce; by the year 2000 that percentage had increased to 20.0 percent and was expected to go up 36.0 percent within the next ten years while the national workforce was only expected to increase by 12.0 percent (Brunette, 2004).

This growing Hispanic population has met an increasing employment need of meat-processing firms throughout the rural United States in the last several decades. An increase in technological efficiency in the 1970s and 1980s (the organization of production, industrial concentration, and plant relocations) lead to a decrease in the skill level required for meat-processing jobs and therefore a drop in wages at a time when the native-born workforce became increasingly well-educated and more likely to pursue other career opportunities (Kandel, 2006; Government Accountability Office,

2005). As a result of the increase in demand for low-skilled workers, the number of Hispanic workers in the meat industry increased from 10.0 percent in 1980 to 30.0 percent in 2000 (Kandel, 2006). In this same time frame, the non-Hispanic White population in the meat processing industry declined from 74 to 49 percent and the Hispanics population increased from 9 to 29 percent: the foreign-born portion of the Hispanic population in the meat industry increased from 50 to 82 percent (Kandel, 2006). Another study done by the U.S. Government Accountability Office (GAO) found that CPS data in 2003 showed 42 percent of the workers in the meat and poultry industry were Hispanic while only 32 percent were white compared with figures for U.S. manufacturing as a whole that same year which showed 14 percent of the workforce was Hispanic and about 70 percent was white (GAO, 2005). Furthermore, the CPS data from 2003 also reflects a 17 percent increase in Hispanic workers and a 14 percent decrease in white workers in the meat and poultry industry from CPS data in 1994 (GAO, 2005).

The continued growth of Hispanic workers in the meat industry creates new challenges in the workforce, especially in regards to effective safety training for these workers. This is significant because a lack of comprehensible safety training has been linked, in part, to higher injury and illness rates among Spanish-speaking, Hispanic workers (Brunette, 2005). As the number of Hispanic, non-English speaking workers has only increased with time and shows no sign of decreasing in the near future, this is an issue that needs attention. That much was recognized by the Occupational Safety and Health Administration (OSHA) when they implemented the Hispanic Outreach program

to address a growing need in the immigrant community (OSHA, 2007). In a fact sheet released by OSHA in 2007, they found that although the overall fatality rate in the United States decreased by 20 percent in the previous decade, the number of fatalities among Hispanic workers actually increased by 35 percent in the same period (OSHA, 2007). OSHA now offers several forms of outreach assistance such as the Hispanic Employers and Workers Compliance Assistance Web Page, OSHA en Español, OSHA dictionaries with English-to-Spanish and Spanish-to-English dictionaries of general OSHA, construction and general industry terms, and Spanish-language publications such as brochures, quick cards, and fact sheets, just to name a few (OSHA, 2007).

What constitutes comprehensible safety training for Spanish-speaking employees is a valid question for employers in the meat processing industry. There are a variety of training options available, but which is more effective? This research paper will review two methods of training and examine the question, "In the meat processing industry, is visual-based safety training more effective than non-visual training methods for non-English speaking, Hispanic employees?" The hypothesis is that visual-based training will result in a more comprehensive understanding of safety regulations and company policies and therefore result in a more effective safety program for non-English speaking, Hispanic employees.

The potential significance of this research could mean enhanced, more effective training methods and materials utilized by meat processing companies with non-English, Spanish speaking employees that have the possibility to lead to higher understanding of safety information resulting in lower injury rates for Hispanic workers. An assumption

that may be made during this research is that the number of participants in this study is representative of all meat processing firms throughout the country. As this study was performed on a small group of 30 participants in central Wisconsin, there are limitations to how much of this information can be generalized.

CHAPTER II

LITERATURE REVIEW

Researchers believe that some of the key causes to increasing injury rates among Hispanic employees is both the increase in immigrants in the workforce and, more importantly for the sake of this study, the lack of effective safety training for Hispanic, non-English speaking employees. In order to overcome this problem, employers must understand the potential barriers they face with Hispanic, non-English speaking employees, the most effective training methods available, and which of those methods are going to be most effective for non-English speaking employees when all of the information is combined.

Barriers to training Hispanic, non-English speaking workers

Some of the significant areas that have been identified as creating a barrier to effective safety training include language barriers, low literacy levels among Hispanic workers, and significant cultural differences (Burnette, 2004; Colorado & Burkhart, 2012; Goodrum & Dai, 2005; Halcarz, 2003). Researchers argue there are other areas that can also affect the lack of effective training and high fatality and injury rates among Hispanic workers, but for the sake of brevity these three will be the focus of this review. Although studies have not been done in the meat industry to support this claim, there is existing research in other industries that focus on the cause of high injury and fatality rates for Hispanic workers that can be applied.

The first and most obvious barrier that is encountered by employers is the language barrier, as English is not the primary language of a large portion of Hispanic workers (Burnette, 2004). Much of the research done on safety training for Hispanic workers indicates that language barriers are at least a factor in the effectiveness of the training (Levesque, Ahmed, & Shen, 2012; O'Connor, Loomis, Runyan, Abboud dal Santo, & Schulman, 2005). As of 2011, 42 percent of Hispanics did not speak English fluently while another 42 percent did not speak English at all (Evia, 2011; Lopez del Puerto, Miller & Gilkey, 2014). There are also many variations in the Spanish language, depending on the area from which the workers originate, which includes a mix of English and Spanish known as "Spanglish" (Evia, 2011). The variation in language and the lack of English skills presents increased challenges for employers and some choose not to address it. For example, one study showed employees with little or no English ability were less likely than the employees with English ability to receive more than an hour of training (O'Connor, et al., 2005). Additional research shows that other employers offer more training but only offer the onsite safety training in English, which a majority of Hispanic participants do not understand (Goodrum & Dai, 2005; Lopez del Puerto, et al., 2014). Other research has found some employers simply skip safety training altogether if the workers do not speak English (Halcarz, 2003). This is not to discredit the efforts of other employers. There are many employers who attempt to provide training in the native language of their employees; however, some employers may feel translating English documents to Spanish will take care of the issue, which is not always the case.

The second challenge encountered by employers with Hispanic workers is that of the literacy level among the group. Within the Hispanic workforce population there is a small but significant portion that cannot read or write in their primary language (Burnette, 2004; Evia, 2011). The reason for this problem is the education among foreign-born Hispanics is generally low. Current Population Survey (CPS) data from 1998-2001 showed Hispanic construction workers had 9.57 mean years of education while another study revealed 56.2 percent of Hispanic farmworkers in North Carolina had less than a sixth grade education level (Goodrum & Dai, 2005; Levesque, et al., 2012). A 2005 study revealed that 40.0 percent of Americans of Hispanics or Latino decent did not complete a high school diploma compared to the 16.0 percent of the overall U.S. population that did not receive a diploma (Burkhart, 2013). The low literacy levels make the use of text heavy training techniques ineffective (Lopez del Puerto, et al., 2014). One study conducted collaboratively by BuildIQ and Virginia Tech Center for Innovation supported this fact when they found general localization, or simple translation, of an existing English program that was very text heavy was not understood well by a portion of the participants (Evia, 2011). Another major problem associated with the literacy level of workers is that existing translated material tends to be translated inaccurately or is overly technical and requires a high reading level that many Hispanic workers do not have. One of the main problems presented by poorly translated materials is it sends a message to the Hispanic employees that the material was not worth translating correctly, therefore it must not be that important (Colorado & Burkhart, 2012; Evia, 2011).

The final barrier for consideration is the cultural differences for Hispanic workers in the United States. Hispanic workers come from a different culture, which presents a variety of challenges when safety training is at hand. For instance, time and again Hispanic workers believe safety training does not apply to them because most have risked their lives at least once on the job and are accustomed to living with an inherent amount of risk in their jobs; because of this, they have a poor understanding of health and safety (Burnette, 2004; Colorado & Burkhart, 2012). Hispanic men also adhere to the idea of "machismo," a cultural state of mind Hispanic men have about their level of toughness: The tougher and more manly they are, the more respect they receive. For this reason, many Hispanic workers tend to think federal regulations are designed for wimpy, American workers and find taking steps to be safe is a weakness and way to get out of work (Colorado & Burkhart, 2012). Another culture shock for Hispanic workers is the idea of government enforcement of safety policies required by law. Numerous Hispanic workers believe government does not effectively enforce safety policies because they have no prior experience with it in their country of origin (Burnette, 2004; Colorado & Burkhart, 2012). Many workers also believe the law does not apply to them because of their undocumented status and fear deportation or loss of employment, so they do not report injuries or safety hazards in order to maintain a good relationship with their employer (Burnette, 2004; Colorado & Burkhart, 2012; Goodrum & Dai, 2005). Many times they are not aware that a lost time injury can actually cost the company money: They believe they are replaceable and if they get hurt the company can simply bring in a different employee (Colorado & Burkhart, 2012). Finally, cultural differences

present challenges to safety professionals who know all of the ins-and-outs of safety, but do not understand these differences (Colorado & Burkhart, 2012).

Existing safety training methods

Now that the barriers for training Hispanic employees are identified, it is beneficial to know what methods exist in order to overcome these barriers. In general industry, OSHA requires employers to provide effective information and training to employees prior to initial job assignment and periodically after that (Thompson, 2000). OSHA does not dictate how that training must be provided. It is up to the employer to utilize the best training methods for their industry. Various narrative reviews support the conclusion that most types of training interventions lead to positive effects on safety knowledge and changes in safety behavior, but not all types of training produce equal results (Burke, Sarpy, Smith-Crowe, Chan-Serafin, Salvador & Islam, 2006). There are multiple styles and methods of training that may be employed.

Existing methods of safety training include information-based techniques, such as lectures, to learner centered, performance-based techniques such as hands on demonstrations (Burke, et al., 2006). Lectures, videos, pamphlets and other types of written materials are the least engaging styles available and are traditionally passive (Burke, et al., 2006). Moderately-engaging methods include training that looks for knowledge results, such as group feedback, and allows workers to learn from their mistakes. One of the more popular moderately-engaging methods is computer-based training (CBT) (Burke, et al., 2006). The most engaging method available for safety training is any type that focuses on the development of knowledge in stages and

emphasizes principles of behavioral modeling. Typical examples of this method include anything with a hands-on demonstration which requires active participation from the group members (Burke, et al., 2006).

Research by Burke, et al. (2006) provided evidence that highly-engaging styles of training are three times more effective in reducing negative safety and health outcomes. Part of the reason for the difference in effectiveness is the fact that adult learners are a challenging audience: they are more selective about their learning and need higher levels of engagement because a gap exists between their right-to-know and their desire to learn (Thompson, 2000). Another reason for the effectiveness of the highly-engaging methods compared to the information-based techniques is the ability of a person to retain knowledge that is directly related to the method of instruction: people retain ten percent of what they read, 20 percent of what they hear, 30 percent of what they see, 50 percent of what they see and hear, 70 percent of what they verbalize, and 90 percent of what they say and do (Thompson, 2000). The goal now is to combine all of this information and find which method is most effective for training Hispanic, non-English speaking workers in order to reduce workplace injuries and fatalities.

Effective safety training methods for Hispanic, non-English speaking workers

A variety of studies are available which investigate training needs and desires of Hispanic, non-English speaking employees. However, most of these studies investigated the weaknesses of current methods utilized by employers and most research was conducted in the agricultural and construction fields. This information for the purpose of this study is to be used as a base of information to support the hypothesis. Much of

the research shows that visual-based, minimal text training provided in the native language of the workers is the preferred method in several industries.

Brunette (2004) conducted a study to find out if training material designed with education, language, and cultural factors in mind is more effective in reducing workplace injuries/fatalities. In this study, she found there are a few options that are better than others.

A visual-based, participatory approach with minimal text even if in the primary language of the worker was found to be more effective than traditional training methods (Burnette, 2004). A study on the preferred style of training for roofers also found that the use of pictures, graphs, short videos, and strong spoken components with limited text was found to be preferred by workers (Lopez del Puerto, et al., 2014). Focus groups of Hispanic employees have also provided feedback about training preferences and have found employees like visuals, such as a cartoon character they can follow throughout the training. Hispanic workers also revealed they are more comfortable receiving safety information from peers who are native speakers of their language and familiar with the work (Brunette, 2004). Radical localized programs with visuals and audio prompts were more effective than the generally localized program (Evia, 2011). This study also found that Hispanic workers preferred to watch the designed program on a single screen in a group setting (Evia, 2011).

Additional research done with the Iowa State University Extension offices also supports the hypothesis that visual-based, minimal text training is more effective for Hispanic workers (Justen, Haynes, VanDerZanden, Grudens-Schuck, 2011; Rajagopal,

2013). The first study by Justen, et al. (2011) included three focus groups of Hispanic workers from the horticulture industry in Iowa who met and discussed the needs of the workers, including training needs. Results from these focus groups indicated Hispanic employees shared several preferences: classes in Spanish, hands-on learning rather than videos and lectures, information printed in Spanish, and use of pictures instead of printed words for organizational purposes (Justen et al., 2011). Another study done by Iowa State University consisted of an hour long training session with immigrant food service workers who spoke little or no English. Research found that after an hour long session with heavy visuals and minimal text the workers knowledge, which was lacking prior to the study, improved on all of the questions following the training (Rajagopal, 2013). This research supports the argument that conducting training using lecture, hands-on activities, and accommodating for cultural differences helps in reaching out to the Hispanic audience and made the training successful (Rajagopal, 2013).

Another study done by Best Institute, Inc. sought to find a more effective training technique for low skilled and unskilled employees who were either illiterate or did not speak English. Best Institute, Inc. created a living laboratory for workers that included real world equipment and focused on activities rather than on reading and writing skills (Halcarz, 2003). A 40 hour program was launched in order to close the gap in training and eliminate barriers. A total of 8,000 workers were trained using the developed program. As a result of the training, there were fewer injuries and lower workers compensation costs (Halcarz, 2003). At the time of the study, the national

average injury rate was 3.9 and the results of the project saw an average injury rate of 0.3, with a decreased cost per claim as well (Halcarz, 2003).

Conclusion

In order to overcome the challenge to provide effective safety training for Hispanic, non-English speaking employees, employers must understand the potential barriers they face with these workers, the most effective training methods available, and which of those methods are going to be most effective for non-English speaking employees when all of the information is combined. After review of the current literature it is clear that language barriers, literacy levels, and cultural differences are all areas that need to be addressed. Also, visual-based, highly engaging training provided in the native language of the workers will be the most effective method of training. This research helps to establish the methodology of this study.

CHAPTER III

METHODOLOGY

The methodology chosen to examine the proposed research question is a quantitative analysis of the effectiveness of visual-based safety training compared to non-visual based safety training for non-English, Hispanic employees in the meat processing industry. The hypothesis tested was that visual based training for non-English, Spanish speaking employees in the meat industry is more effective (meaning more information will be understood and retained by the participants) than non-visual based training methods. For the purpose of this study, an experimental study was done and compared the performance of two groups of participants consisting of 15 individuals in each group. The independent variable in the experiment is the style of training utilized for each group: the control group received safety training information in an oral, non-visual presentation in Spanish and the experimental group received the same safety training information in Spanish with a visual-based training format utilizing PowerPoint and included pictures and videos. In order to assess the effectiveness of the training, the participants were asked to participate in a 15 question quiz that reviewed the safety information that was presented to them. The results were compared to determine which group performed better on the quiz.

Participants

For this research study, two groups of 15 presented: a control group and an experiment group. The focus of this study was to find out if visual-based training is more

effective than an oral, non-visual based presentation for non-English speaking, Hispanic employees in the meat industry. For this reason, the recruiting took place at a beef slaughter facility and a pork slaughter facility located in Abbotsford, WI and Curtiss, WI. The beef slaughter facility has an estimated 650 employees, about 150 of which are non-English speaking, Hispanic employees while the pork slaughter facility on average employs 240 employees, about 80 percent of which are non-English, Hispanic employees. Employee ages range from 18-65 and both males and females are employed. The Hispanic employee population at the beef and pork slaughter facilities is representative of the Hispanic population in the meat industry throughout the rural United States, so a sample from these two facilities should represent other meat processing facilities throughout the country. In order to recruit enough people for the study, flyers were posted at both locations asking for volunteers. Also, recruiters in each facility were enrolled to go around the two locations and speak to employees about the study to try and garner participation. Compensation to participants came in the form of beverages and snacks on the day of the study. No other compensation was offered. Participation in this study was voluntary.

Demographics

A total number of 30 participants arrived for the study. One individual left prior to completing the session; therefore there were 29 completed quizzes. A brief demographics survey was given to each individual as part of the quiz they completed after the training session. The survey requested age range, race, gender, years worked in the meat industry, and highest completed education level.

Procedures and materials

Prior to the study, two native Spanish-speaking individuals were recruited to perform the training: this eliminated any issues with a language barrier. If the training was performed by someone whose first language is not Spanish, there could be miscommunication.

On the day of the study, all volunteers met in one location at the same time. A room in a city hall was rented for the morning, which was then divided into three sections using wall dividers. Two rooms were used for training while the third, center room was the gathering place for volunteers before training commenced. Once all voluntary participants were present, they were split into two groups. This was done randomly by having each individual draw a number from a bowl that had either "1" or "2". The total number of participants was found prior to putting numbers into the bowl in order to ensure an even number of people in each training session. Once everyone had their number, one of the instructors then drew a number. This ensured the groups were randomly placed in their training session. Group number 1 received the visual-based training while group number 2 received the oral presentation.

Once the participants were placed in their session rooms, they were provided with informed consent paperwork. The informed consent before the training again explained to participants that the study was voluntary. They were also informed the research they were participating in was to better understand what forms of training are more effective for their specific group (non-English, Spanish speaking employees in the meat industry). The information explained to participants that this research was trying

to find out the best way to train Hispanic, Spanish speaking employees in the meat industry. Also prior to the training, the instructors explained to the participants that there were two different groups getting the same training but using different methods and that the results would be compared to see which way was more effective.

Each group was presented with safety focused training materials in Spanish: the control groups received only an oral presentation in Spanish of the required regulation and the experimental group received a visual-based presentation consisting of pictures and videos comprising of the same information. The information given to each group was identical: the only variable was the method of presentation. A safety topic that was unfamiliar to all participants was chosen in order to avoid any prior knowledge affecting the results. For this study, the chosen topic was emergency exits and included definitions, the purpose of the standard and training, specific requirements within the standard for emergency exit routes, signage requirements, alarm requirements, and maintenance requirements of the emergency system. The training lasted no longer than 30 minutes for each group, which was then followed by a quiz to test the retention of the information presented during the training session. The quiz consisted of 15 questions, ranging from multiple-choice, true/false, and fill-in-the-blank. For the sake of participant comfort, names were omitted to encourage honest answers. The only identifier on the quizzes was whether the participant was in the control group or the experimental group (Group 1 or Group 2).

Upon completion, the quizzes were collected and scored. The scores were recorded onto an excel spreadsheet and the average mean of each group was

determined and recorded onto a data chart. A t-test was performed to determine if there was a statistically significant difference between the two groups.

CHAPTER IV

RESULTS

Demographics

The age range of the participants were as follows: 3 participants identified as 18-24, 13 participants identified as 25-34, 7 participants identified as 35-44, 3 participants identified as 45-54, 2 participants identified as 55-64 and 1 participant identified as 65-74. There was 1 participant that did not report an age range. Except for one with no response, all of the individuals in the study identified their race as Hispanic/Latino.12 participants in the study identified as male, 13 participants in the study identified as female, and 5 participants did not report a gender. For years worked in the industry, 12 participants reported they had 0-5 years, 8 reported 6-10 years, 6 reported 11-15 years, 1 reported 15-20 years, 1 reported 21-25 years, and 2 participants did not select a response. For highest education level completed, 2 participants reported no school, 3 reported some grade school, 4 reported grade school complete, 3 reported some middle school, 9 reported middle school complete, 5 reported some high school, 2 reported high school complete, and 2 individuals reported college complete. Table 1 and table 2 contain demographic information for participants in Group 1 and Group 2.

Table 1

Group 1 demographics

Participant	Age Group	Race	Sex	Years in Industry	Educational Level
G1-01	25-34	Hispanic	M	0-5	Middle School
G1-02	25-34	Hispanic	M	0-5	Some High School
G1-03	18-24	Hispanic	F	NR	Middle School
G1-04	18-24	Hispanic	M	0-5	Some High School
G1-05	45-54	Hispanic	NR	0-5	Middle School
G1-06	35-44	Hispanic	F	6-10	Some High School
G1-07	45-54	Hispanic	M	6-10	Some Elementary
G1-08	55-64	Hispanic	M	0-5	College
G1-09	35-44	Hispanic	F	21-25	Elementary School
G1-10	25-34	Hispanic	M	6-10	No School
G1-11	25-34	Hispanic	F	0-5	Elementary School
G1-12	65-74	Hispanic	NR	NR	No School
G1-13	25-34	Hispanic	M	0-5	Middle School
G1-14	25-34	Hispanic	M	0-5	Middle School
G1-15	35-44	Hispanic	F	11-15	Middle School

Note. NR = No Response

Table 2

Group 2 demographics

Participant	Age Group	Race	Sex	Years in Industry	Educational Level
G2-01	25-34	Hispanic	NR	11-15	Some Middle School
G2-02	25-34	Hispanic	M	6-10	Middle School
G2-03	55-64	NR	M	6-10	Some Elementary
G2-04	35-44	Hispanic	NR	6-10	Middle School
G2-05	25-34	Hispanic	F	11-15	High School
G2-06	45-54	Hispanic	F	0-5	Some Elementary
G2-07	NR	Hispanic	NR	11-15	Some Middle School
G2-08	35-44	Hispanic	F	11-15	Some High School
G2-09	18-24	Hispanic	F	0-5	High School
G2-10	25-34	Hispanic	M	6-10	Elementary School
G2-11	35-44	Hispanic	F	0-5	Elementary School
G2-12	25-34	Hispanic	M	6-10	Middle School
G2-13	25-34	Hispanic	F	0-5	Elementary School
G2-14	25-34	Hispanic	F	11-15	Some High School
G2-15	35-44	Hispanic	F	15-20	College

Note. NR = No Response

Quiz results

After the presentation, each participant was administered a 15 question quiz to assess the comprehension and retention of the training they received. Table 3 and Table 4 contain a chart of the participant performance in each group out of a total of 15 points. An observation of the charts shows a clear difference in scores between Group 1 and Group 2. Group 1, the group with the visual-based presentation, had eleven participants with a score of 10/15 or higher (shown in Table 3). The mean average for Group 1 was 9.67.

Table 3

Group 1 participant quiz scores out of a total of 15

Group 1 Results	
Participant	Score
G1-01	10
G1-02	10
G1-03	8
G1-04	11
G1-05	10
G1-06	11
G1-07	6
G1-08	10
G1-09	10
G1-10	7
G1-11	12
G1-12	11
G1-13	10
G1-14	11
G1-15	8

Note. Mean average = 9.67

Table 4

Group 2 participant quiz scores out of a total of 15

Group 2 Results	
Participant	Score
G2-01	9
G2-02	7
G2-03	8
G2-04	11
G2-05	9
G2-06	7
G2-07	8
G2-08	9
G2-09	9
G2-10	9
G2-11	10
G2-12	9
G2-13	7
G2-14	9
G2-15	NR

Note. Average mean = 8.64

*G2-15 left the study prior to session and did not participate in the quiz

Group 2, the group with the non-visual based presentation, had only two participants with a score of 10/15 or higher (shown in Table 4). The mean average for Group 2 was 8.64. From here we can acknowledge that the average scores are different as Group 1 had a mean of 9.67 and Group 2 had a smaller mean of 8.64, but we need to determine whether or not the results are statistically significant. In order to determine whether or not these results are statistically significant, a t-test was needed. Using Microsoft Excel 2010, a t-test was performed to compare the mean of the two groups. Table 5 shows the results of the t-test.

Table 5

T-test results

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	9.666666667	8.642857143
Variance	2.80952381	1.324175824
Observations	15	14
Hypothesized Mean Difference	0	
df	25	
t Stat	1.928336134	
P(T<=t) one-tail	0.032621943	
t Critical one-tail	1.708140761	
P(T<=t) two-tail	0.065243885	
t Critical two-tail	2.059538553	

Note. Alpha value of 0.05

Among the non-English speaking, Hispanic employees that participated in this study (N=29), there was not a statistically significant difference in the scores for Group 1 (M=9.67, SD=1.68) and Group 2 (M=8.64, SD=1.15) conditions; t(25) = 1.93, p =0.065. A confidence level of 95 percent was used to determine the p value, so a p value of less than 0.05 is needed to show a significant difference. Here the p value was 0.065, which is slightly over the threshold needed. These results suggest that the hypothesis is null and the visual-based presentation is not more effective than the non-visual presentation for non-English speaking, Hispanic workers in the meat industry.

CHAPTER V

DISCUSSION

While the results of this study did not find there to be a significant difference in the two training styles, there are multiple factors that affected the results.

Education level

One area that affected the results of the study is the education level of the participants. The quiz was formatted with 15 questions ranging from multiple-choice, true/false, and fill-in-the-blanks. As stated in the demographics section, only four out of the 30 participants reported an education level as high school complete or higher: The other 26 participants had an education level lower than high school completion. Five of the participants had no school or only some elementary school. The quiz used to evaluate the participants was not adjusted to fit the lower education level prior to the study. Several participants from both groups asked questions during the study for clarity on questions. From this information, it is possible that some of the participants scored lower not because of a lack of understanding the training, but rather because they could not comprehend the written quiz. In order to demonstrate the difference that lower education levels can make, I removed all participant results that had “no school” or only “some elementary school” from both Group 1 and Group 2 and performed a t-test with the updated information using the same confidence level of 95 percent. Table 6 contains the results of the new t-test.

Table 6

T-test results with lower education levels removed from sample

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	10.08333333	8.833333333
Variance	1.356060606	1.242424242
Observations	12	12
Hypothesized Mean Difference	0	
df	22	
t Stat	2.686213588	
P(T<=t) one-tail	0.006744594	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.013489187	
t Critical two-tail	2.073873068	

Note. Alpha value of 0.05

These results show that there is a significant difference in the scores for Group 1 (M=10.08, SD=1.16) and Group 2 (M=8.83, SD=1.11), conditions; t(22)=2.69, p=0.013. As the p value here is now below 0.05, it can be speculated that the education level of the participants may have affected their ability to answer the questions correctly.

Sample size

Sample size was also a negative factor in the study. The original goal was to recruit 60 participants and have two groups of 30; however, only 30 participants attended the training sessions and 29 of them completed the training and the quiz that followed. The small sample size is not a good representation as an above average or below average score from one member drastically affects the entire median of the group. Referring back to the group scores, Group 1 had eleven participants with scores of 10/15 or more while Group 2 only had two; however, Group 1 also had one

participant that only scored a 6/15, which brought the median of the group down to 9.60. If we remove that one score and find the median of the other 14 participants in Group 1, we now have a median of 9.93. A larger sample size would more effectively negate the occasional lower-than-average scores.

Conclusion

The continued growth of Hispanic workers in the meat industry creates new challenges in the workforce, especially with regard to effective safety training for these workers. Some of the significant areas that have been identified as creating a barrier to effective safety training include language barriers, low literacy levels among Hispanic workers, and significant cultural differences. A variety of studies are available which investigate training needs and desires of Hispanic, non-English speaking employees. Existing research supports the notion that visual-based training is more effective for this particular group of workers; however, most of the studies that investigated the weaknesses of current methods utilized by employers was conducted in the agricultural and construction fields. This study was conducted to identify whether or not visual-based safety training is more effective than a non-visual style of training for non-English, Spanish speaking employees in the meat industry. While this study did see a difference in scores between Group 1 and Group 2, the results did not have a statistically significant difference. The educational level of the participants and the size of the sample group are potential reasons the results were not statistically different as the removal of all participants with less than middle school education and the removal of the lowest score all resulted in a statistically significant different in results. Based on

these results, further research with larger group samples that consider educational levels may very likely show a significant difference in the training methodologies.

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APPENDIX A:

Emergency Exit Training Script (Spanish)

Salidas

El propósito de la regulación.

Empleadores deben proporcionar rutas de salida adecuadas y salidas para que los empleados utilizan de forma segura para salir el lugar de trabajo en caso de emergencia. Se puede encontrar las regulaciones en 29 CFR 1910 Subpart E – Rutas de salida, planes de acción de emergencia, y planes de prevención de incendios.

Definiciones

Una "ruta de salida" es un camino continuo y sin obstrucciones de cualquier punto dentro de un lugar de trabajo a un lugar seguro (incluyen las zonas de refugiados). Una ruta de salida consiste en tres partes: el acceso a la salida, la salida, y la descarga de salida.

Una ruta de salida incluye toda área vertical y horizontal (escaleras, rampas, pasillos, etc.) a lo largo de la ruta.

Una "salida" es la porción de la ruta de salida que generalmente está separada de otras áreas para dar una vía protegida para salir fuera del lugar del trabajo. Es parte de la ruta de salida. Un ejemplo de una salida es una escalera cerrada con clasificación de resistencia al fuego de dos horas que conduce desde el quinto piso de un edificio de oficinas en el exterior del edificio.

Requisitos de la ruta de salida y salidas en una facilidad

Al menos dos rutas de salida que estén lejos la una de la otra deben estar a la disposición. Esto asegurar medios alternativos para que los empleados dejan el lugar de trabajo seguro durante una emergencia. Cuando un incendio o situación emergencia hace una ruta de salida insegura o inaccesible, hay otra ruta de salida disponible en otra parte del edificio.

Se permite una sola ruta de salida donde el número de empleados, el tamaño del edificio, el número de ocupantes del edificio, o la disposición del lugar de trabajo indica que una sola salida permitirá a todos los empleados salgan con seguridad durante una emergencia. Otros medios de evacuación deben estar disponibles si hay una sola ruta de salida, como escalera de incendios o ventanas accesibles.

Si la dependencia de sólo dos rutas de salida podría poner en peligro a los empleados, más de dos rutas de salida deben estar disponibles. Deben tenerse en cuenta el número

de empleados, el tamaño del edificio, el número de ocupantes del edificio, y la disposición del lugar de trabajo se consideran al determinar el número de rutas de salida que se necesita.

*In the visual presentation, show a map with all of the exit routes for both locations.

Requisitos de resistencia al fuego de las salidas

Debe haber una separación entre la salida y el resto del lugar del trabajo. Las salidas deben estar protegidas por una puerta contra incendios que se cierre sola. La puerta contra incendios debe estar aprobada por un laboratorio nacionalmente reconocido. Las puertas que típicamente llegar a una escalera de edificio son ejemplos de cómo las salidas son separadas y protegidas por las puertas contra incendios. No se debe bloquear para dejar abiertas las puertas contra incendios. Son designadas para cerrar automáticamente detrás de la gente para protegerlos de humo, calor, e incendio mientras que salgan del edificio durante una evacuación de emergencia.

Las rutas de salida deben mantenerse seguras

Se debe mantener las rutas de salida libres de materiales o equipo que obstruya y deben tener luz adecuada. Las escaleras o rampas pueden ser parte de la ruta de salida. El propósito de la ruta de salida es llegar a una salida. Las rutas de salida no pueden llevar a los empleados hacia un callejón sin salida o a un cuarto que puede estar con llave.

Las rutas de salida deben estar libres de muebles o decoraciones altamente inflamables. Los empleados que usan la ruta de salida no pueden ser obligados a viajar hacia áreas donde hay materiales sin blindaje que se queman muy rápidamente, emiten gases venenosos o son explosivos.

Los letreros por la ruta de salida indican la dirección del movimiento hacia la salida más cercana.

* Explain some of the steps that your facility takes to meet these requirements.*

Requisitos que aseguran que las salidas sean seguras y fáciles de usar

Las salidas deben conducir directamente hacia fuera o hacia un lugar abierto con acceso a la parte exterior. El área más allá de la salida debe tener suficiente espacio para la gente que probablemente use la salida.

Las puertas de salida deben ser fáciles de abrir sin llaves ni instrucciones especiales. Las puertas de salida no deben tener ni alarmas ni aparatos que restrinjan el uso de la salida en una emergencia en caso de que el aparato falle.

Cuando las escaleras de la ruta de salida continúen más allá del piso donde la gente sale, debe haber puertas o tabiques en el piso de salida para asegurar que la dirección de viajar de salida es clara a los empleados.

Una puerta con bisagras laterales debe usarse para conectar cualquier cuarto con una ruta de salida. Las puertas deben girar hacia fuera del cuarto dentro de la ruta de salida si un cuarto está ocupado por más de 50 personas o contiene materiales altamente inflamables o explosivos.

Las rutas de salida deben tener capacidad y tamaño adecuados

Las rutas de salida deben poder dar cabida al máximo permitido de personas por cada piso del edificio. La capacidad de la ruta de salida no debe disminuir a lo largo de la dirección del trayecto hacia la salida.

El techo de la ruta de salida debe ser por lo menos 7 pies, 6 pulgadas en alto. Cualquier cosa que proyecta del techo no puede llegar en punto menos que 6 pies, 8 pulgadas del piso. El acceso de salida debe ser por lo menos 28 pulgadas de ancho. Las salidas deben ser más anchas para dar cabida a más ocupantes. Se debe cumplir con tamaños mínimos aun si objetos se proyectan hacia la ruta de salida.

Requisitos para rutas de salida exteriores.

Las rutas de salida exteriores son permitidas. Deben cumplir los mismos requisitos que las salidas interiores. Adicionalmente, las rutas de salida exteriores:

* Deben tener pasamanos para proteger los lados no cercados.
* Se deben cubrir en caso de acumulación de nieve o hielo es probable y no se quita antes de que presenta un riesgo de resbalones.
* Deben ser razonablemente derechas con pisos lisos, sólidos y sustancialmente nivelados.
* No deben tener callejones sin salida más largos de 20 pies.

Se deben señalar las rutas de salida

Cada salida debe estar claramente visible y señalada con un letrero que diga “EXIT.” El campo de visión de la salida debe estar libre de muestras y objetos. Los letreros de

salida deben estar bien iluminados. Las puertas de salida deben estar libres de decoraciones u otros letreros que bloqueen la visibilidad. Puertas/pasillos que se puedan confundir con salidas deben señalarse “Not an Exit” o con una indicación de que es (al sótano,” “almacenamiento,” “armario de ropa,” etc).

Requisitos para sistemas de alarmas.

Los lugares de trabajo deben tener sistemas de alarmas operables para los empleados que tienen señales características para advertir a los empleados sobre incendios u otras emergencias. El sistema debe cumplir con los requisitos de 29 CFR 1910.165 de OSHA.

Edificio de un tamaño, disposición, o la ocupación que los empleados recibirían una advertencia adecuada al ver u oler un incendio u otro peligro no necesitarían instalaciones de alarma contra incendios.

Requisitos de mantenimiento.

Cuando el sitio del trabajo tenga pinturas/recubrimientos que retarden incendios, se debe mantener esos materiales. Mantenga el siguiente en buen estado funcionamiento: sistemas de rociadores contra incendios, sistemas de alarmas, puertas contra incendios, iluminación para las salidas, otras protecciones para los empleados.

Mantenimiento de salidas durante construcción/reparación.

Los empleados no se les permiten ocupar un lugar de trabajo en construcción hasta que un número adecuado de las rutas de salida apropiadas se han completado y listo para uso de los empleados. Durante la construcción de las actividades de reparación, los empleados solo pueden ocupar un lugar de trabajo, siempre y cuando todas las salidas y la protección contra incendios existente se mantiene o si se proporciona, protección contra incendios alternativa, la misma protección. Cuando se usen materiales inflamables/explosivos durante la construcción, reparación, o alteraciones, no se puede exponer a los empleados a peligros que de otro modo no estuviesen presentes y no se puede impedir el escape de empleados por el uso de estos materiales.

APPENDIX B:

Emergency Exit Training Script (English)

Training information obtained from KellerOnline

Purpose of the regulation

Employers must provide adequate exit routes and exits for employees to safely use to leave the workplace in case of an emergency. The regulations can be found at 29 CFR 1910 Subpart E - Exit Routes, Emergency Action Plans, and Fire Prevention Plans.

Definitions

An 'exit route' is a continuous and unobstructed path of exit travel from any point within a workplace to a place of safety (including refuge areas). An exit route consists of three parts: the exit access, the exit, and the exit discharge. An exit route includes all vertical and horizontal areas (stairs, ramps, aisles, etc.) along the route.

An 'exit' is the portion of the exit route that generally is separated from other areas to provide a protected way of travel to the exit discharge. An example of an exit is a two-hour fire resistance-rated enclosed stairway that leads from the fifth floor of an office building to the outside of the building.

Requirements for how many exit routes and exits are needed

At least two exit routes that are remote from each other must be available. This ensures alternate means for employees to leave the workplace safely during an emergency. When a fire or emergency situation makes one exit route unsafe or inaccessible, there will be another exit route available in another part of the building.

A single exit route is allowed where the number of employees, the size of the building, its occupancy, or the arrangement of the workplace indicates that a single exit will allow all employees to exit safely during an emergency. Other means of escape should be available if there is only one exit route, such as fire escapes, or accessible windows.

If reliance on only two exit routes could endanger employees, more than two exit routes must be available. The number of employees, the size of the building, its occupancy, and the arrangement of the workplace need to be considered when determining the number of exit routes that are needed.

Fire-resistance requirements for exits

There must be a separation between the exit and the rest of the workplace. Exits must be protected by a self-closing fire door. The fire door must be listed or approved by a nationally recognized testing laboratory. The doors that typically lead to a building's stairway are examples of how exits are separated and protected by fire doors. These

doors must not be blocked open - they are designed to automatically close behind people to protect them from smoke, heat, and fire as they exit during an emergency evacuation.

Exit routes must be kept safe

Exit routes must be kept free of obstructing material or equipment, and they must have adequate lighting. Stairs or ramps can be part of the exit route. The purpose of an exit route is to reach an exit - the exit route cannot lead employees toward a dead end or through a room that can be locked.

Exit routes must be free of highly flammable furnishings or decorations. Employees using the exit route may not be required to travel toward areas where there are unshielded materials that burn very quickly, emit poisonous fumes, or are explosive.

Signs must be posted along the exit route to indicate the direction of travel to the nearest exit.

Requirements to ensure that exits will be safe and easy to use

Exits must lead directly outside, to a street, walkway, refuge area, public way, or to an open space with access to the outside. The area beyond the exit has to have enough room to accommodate the people who are likely to use the exit.

Exit doors must be able to be readily opened without having to use keys, tools, or special knowledge. Exit doors cannot have any alarm or device that would restrict emergency use of the exit if the device fails.

When exit route stairs continue beyond the floor where people are to exit, there must be doors or partitions at the exit discharge floor to assure that the direction of exit travel is clear to employees.

A side-hinged exit door must be used to connect any room to an exit route. A door leading from a room that may be occupied by more than 50 people, or from a room that contains highly flammable or explosive materials, must swing out from the room into the exit route.

Adequate capacity and size

An exit route must be able to support the maximum-permitted occupant load for each floor of the building that is served by the exit route. The exit route's capacity must not decrease along the direction of exit travel.

The ceiling of an exit route must be at least 7 feet, 6 inches high. Any projection from the ceiling must not reach a point less than 6 feet, 8 inches from the floor. Exit access must be at least 28 inches wide. Exit access must be wider if necessary to accommodate the occupant load. These minimum sizes must be met even if objects project into the exit route.

Outdoor exit routes

Outdoor exits routes are allowed. They must meet the same requirements that apply to indoor exit routes. In addition, outdoor exit routes:

* Must have guardrails to protect unenclosed sides.
* Must be covered if accumulation of snow or ice is likely and is not removed before it presents a slipping hazard.
* Must be reasonably straight with smooth, solid, substantially level walkways.
* Must have no dead ends longer than 20 feet.

How to mark exit routes

Outdoor exits routes are allowed. They must meet the same requirements that apply. Each exit must be clearly visible and marked by a sign that reads 'Exit.' The line-of-sight to the exit sign must be clearly visible at all times. Exit signs must be properly illuminated. Each exit door must be free of decorations or other signs that obscure its visibility. Any doorway or passage that might be mistaken for an exit must be marked 'Not an Exit' or with an indication of its actual use ('To Basement,' 'Storeroom,' 'Linen Closet,' etc.).

Requirements for alarm systems

The workplace must have an operable employee alarm system with a distinctive signal to warn employees of fire or other emergencies. The alarm system must meet the requirements of 29 CFR 1910.165.

Buildings of a size, arrangement, or occupancy where employees would receive

adequate warning by seeing or smelling a fire or other hazard would not need fire alarm facilities.

Maintenance requirements

When the workplace contains fire retardant paints or other coatings, their fire retardant properties must be maintained. Keep the following in proper working order: Sprinkler systems,
alarm systems, fire doors, exit lighting, and other safeguards to protect employees.

Construction and repair activities

Employees are not allowed to occupy a workplace under construction until an adequate number of appropriate exit routes are completed and ready for employee use. During building repair activities, employees may only occupy a workplace as long as all exits and existing fire protection is maintained or if alternate, equally protective, fire protection is provided. When flammable or explosive materials are used during construction, repairs, or alterations, employees may not be exposed to hazards that are beyond the normal permissible conditions in the workplace, and employee emergency escape may not be impeded by the use of these materials.

APPENDIX C:

Emergency Exit Quiz (Spanish)

Quiz – Exits **Grupo: _____**

1. **Una salida debe llevar a:**

   a. un lugar que no se necesite para las operaciones de los bomberos.
   b. A un lugar seguro, abierto con suficiente espacio para todas las personas que usen la salida.
   c. A un lugar que esté viento arriba del incendio.
   d. Al frente del edificio o a un lugar de estacionamiento.

2. **Las rutas de salida:**

   a. No pueden llevar a una rampa.
   b. No se pueden usar para almacenamiento provisional.
   c. No pueden llevar a un cuarto que pudiera estar cerrado con llave.
   d. Deben inspeccionarse al principio y al fin de cada jornada o turno.

3. **Una puerta que pudiera ser erróneamente identificada como una salida:**

   a. Debe estar marcada "Not an Exit" (No es salida).
   b. Debe estar cerrada con llave.
   c. Puede estar identificada con un letrero que indica cómo se usa el recinto detrás de la puerta.
   d. Ya sea a. o c.

4. **Las rutas de salida necesitan estar marcadas:**

   a. Con letreros que muestren la dirección de la salida más cercana.
   b. Con tiras de color codificadas.
   c. Con luces parpadeantes después de que haya sonado la alarma.
   d. Con flechas rojas de 6 pulgadas de ancho sobre un fondo blanco.

5. **Una salida:**

   a. Es lo mismo que una ruta de salida.
   b. Es parte de la ruta de salida.
   c. Puede estar cerrada con llave si más de una persona tiene la llave.
   d. Puede incluir un pasillo que viene desde la cafetería.

6. **Cuando un edificio tiene dos rutas para salir:**

   a. Estas deben llevar a una salida diferente en caso de que la otra salida esté bloqueada.
   b. Ambas rutas de salida pueden llevar a la misma salida.

c. Sólo una de las rutas de salida necesita el uso de las escaleras.
d. No necesitan ser tan anchas como sería una sola ruta de salida.

7. **Una puerta contra incendios:**

a. Ha sido aprobada por su resistencia a fuego.
b. Se cierra sola.
c. Protege las salidas.
d. Todo lo de arriba.

8. **Un sendero continuo, sin obstrucciones para salir, de cualquier lugar dentro del lugar de trabajo a un lugar seguro, es la definición de:**
a. Corredor.
b. Salida.
c. Ruta de salida.
d. Todo lo de arriba.

9. **Una escalera resistente a fuego es un ejemplo de una salida.**

¿Sí o no?

10. **Se debe fijar _____ a lo largo de la ruta de salida para indicar la dirección del camino hacia la salida más cercana.**

11. **Las rutas de salida externas deben tener pasamanos para proteger sus lados abiertos.**

¿Verdadero o falso?

12. **Se puede usar una puerta de salida _____ para conectar cualquier cuarto a la ruta de salida.**

13. **No se necesita iluminar los letreros de "Exit" (salida).**

¿Verdadero o falso?

14. **Si una puerta de salida es difícil de abrirse, o requiere instrucciones especiales, las instrucciones deben estar indicadas en la puerta.**

¿Verdadero o falso?

15. **Si las escaleras de la ruta de salida continúan más allá del piso donde las personas deben salir, debe haber puertas o biombos que indiquen claramente la dirección de la salida.**

¿Sí o no?

APPENDIX D:

Emergency Exit Quiz (English)

Training quiz obtained from KellerOnline

Quiz - Exits

1. **An exit must lead to:**

   a. An area that will not be needed for fire department operations.
   b. A safe, open area with enough room for all of the people who use the exit.
   c. An area that is upwind of the fire.
   d. The front of the building or a parking lot.

2. **Exit routes:**

   a. Can't lead toward a ramp.
   b. Can be used for temporary storage.
   c. Can't lead toward a room that may be locked.
   d. Must be inspected at the beginning and end of each shift.

3. **A doorway that might be mistaken for an exit:**

   a. Can be marked "Not an Exit."
   b. Must be locked.
   c. Can be marked with a sign that says how the room is used.
   d. Either a or c.

4. **Exit routes need to be marked:**

   a. With signs that show the direction to the nearest exit.
   b. With color-coded stripes.
   c. With flashing lights after the alarm has sounded.
   d. With 6 inch wide red arrows on a white background.

5. **An exit:**

   a. Is the same thing as an exit route.
   b. Is part of an exit route.
   c. Can be locked if more than one person has the key.
   d. Can include the hallway that leads from the cafeteria.

6. **When a building has two exit routes:**

   a. They must lead to different exits in case one exit route is blocked.
   b. Both exit routes can lead to the same exit.
   c. Only one of the exit routes can use a stairway.
   d. They do not need to be as wide as when there is only one exit route.

7. **A fire door:**

a. Is approved for fire-resistance.
b. Is self-closing.
c. Protects exits.
d. All of the above.

8. **A continuous and unobstructed path of exit travel from any point within a workplace to a place of safety is the definition of:**
a. Corridor.
b. Exit.
c. Exit route.
d. All of the above.

9. **A fire resistant enclosed stairway is an example of an exit.**

True or false?

10. **_____ must be posted along the exit route to indicate the direction of travel to the nearest exit.**

11. **Outdoor exit routes must have guardrails to protect unenclosed sides.**

True or false?

12. **A _____ exit door must be used to connect any room to an exit route.**

13. **Exit signs don't need to be illuminated.**

True or false?

14. **If an exit door is difficult to open or takes special instructions, the instructions may be posted on the door.**

True or false?

15. **If exit route stairs continue beyond the floor where people are to exit, there must be doors or partitions to clearly indicate the direction of exit travel.**

True or false?

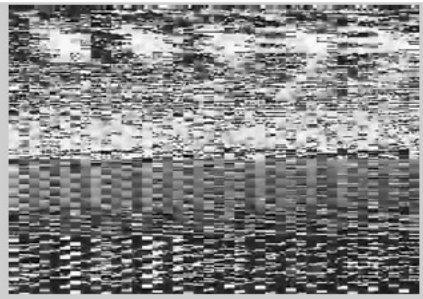
APPENDIX E

Emergency Exit Visual Presentation (Spanish)

SALIDAS

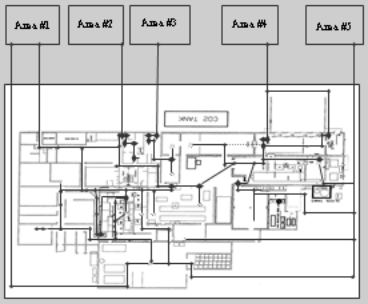
Rutas de salida y planes de acción de emergencia

EL PROPÓSITO DE LA REGULACIÓN

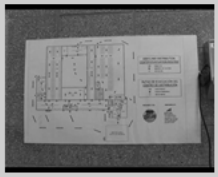


100 se murieron, 200 se lastimaron.

DEFINICIONES

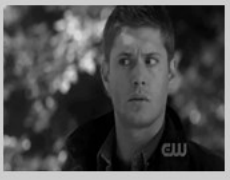


Rutas de salida



DEFINICIONES

- Deben estar claros...



¿Estás en serio?

DEFINICIONES

3

DEFINICIONES

- Salida

DEFINICIONES

Descarga de la salida

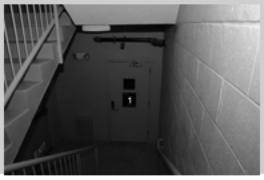
DEFINICIONES

- La ruta de salida incluye **toda** área vertical y horizontal a lo largo de la ruta.



DEFINICIONES

- La salida es la porción de la ruta de salida que está separada de otras áreas para dar una vía protegida para salir fuera del lugar del trabajo.

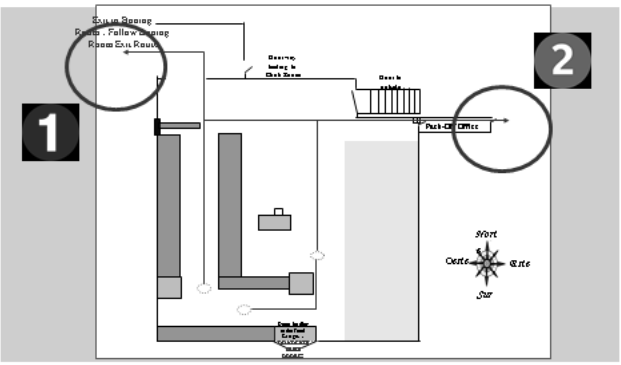



REQUISITOS DE LA RUTA DE SALIDA Y SALIDAS EN UNA FACILIDAD

2

rutas de salida son requeridas

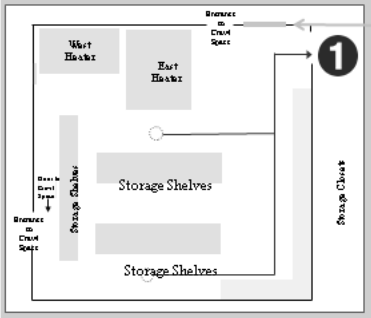
REQUISITOS DE LA RUTA DE SALIDA Y SALIDAS EN UNA FACILIDAD



REQUISITOS DE LA RUTA DE SALIDA Y SALIDAS EN UNA FACILIDAD

REQUISITOS DE LA RUTA DE SALIDA Y SALIDAS EN UNA FACILIDAD

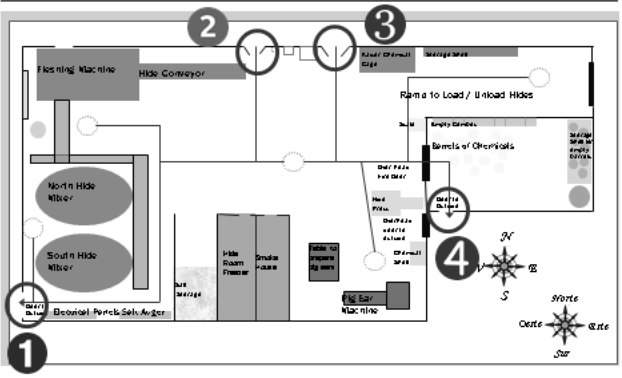
- Una sola ruta de salida se permite bajo unas condiciones.



Ventana

Escalera

REQUISITOS DE LA RUTA DE SALIDA Y SALIDAS EN UNA FACILIDAD



REQUISITOS DE RESISTENCIA AL FUEGO DE LAS SALIDAS

Una puerta contra incendios

REQUISITOS DE RESISTENCIA AL FUEGO DE LAS SALIDAS

Puertas que llegan a una escalera...

REQUISITOS DE RESISTENCIA AL FUEGO DE LAS SALIDAS

- Nunca se debe bloquear para dejar abiertas las puertas contra incendios

LAS RUTAS DE SALIDA DEBEN MANTENERSE SEGURAS

- Libres de materiales o equipo
- Luz adecuada

LAS RUTAS DE SALIDA DEBEN MANTENERSE SEGURAS

Escaleras y rampas están bien

LAS RUTAS DE SALIDA DEBEN MANTENERSE SEGURAS

- No puede llevar a un callejón sin salida o a un cuarto que puede estar con llave.

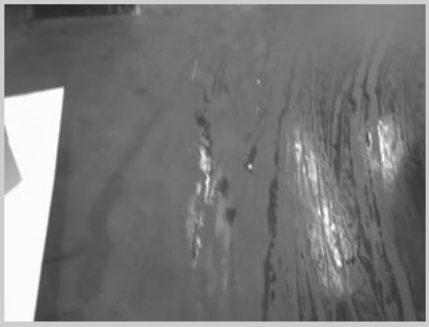
LAS RUTAS DE SALIDA DEBEN MANTENERSE SEGURAS

- Muebles o decoraciones altamente inflamables no son permitidos.

LAS RUTAS DE SALIDA DEBEN MANTENERSE SEGURAS

- El letrero indica la dirección

REQUISITOS QUE ASEGURAN QUE LAS SALIDAS SEAN SEGURAS Y FÁCILES DE USAR



REQUISITOS QUE ASEGURAN QUE LAS SALIDAS SEAN SEGURAS Y FÁCILES DE USAR

Sin llaves ni instrucciones especiales

REQUISITOS QUE ASEGURAN QUE LAS SALIDAS SEAN SEGURAS Y FÁCILES DE USAR

REQUISITOS QUE ASEGURAN QUE LAS SALIDAS SEAN SEGURAS Y FÁCILES DE USAR

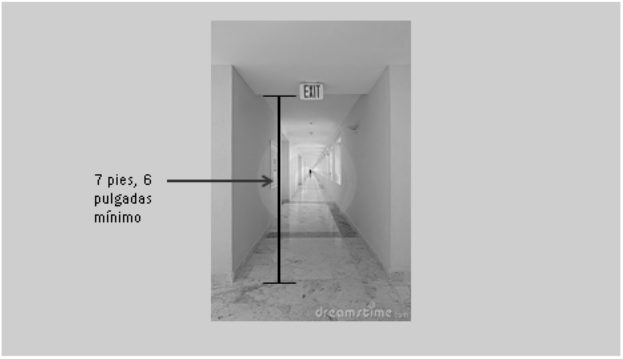
Al conectar los cuartos en la ruta de salida

Necesario cuando hay más de 50 personas

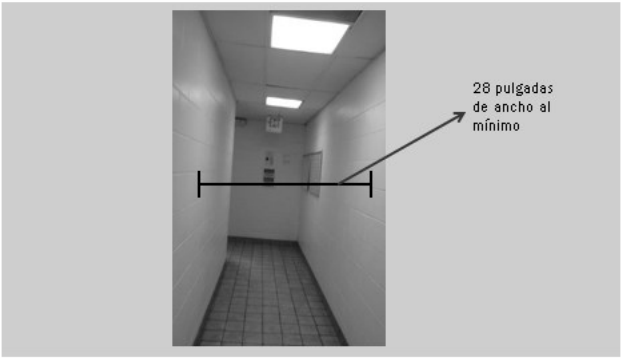
LAS RUTAS DE SALIDA DEBEN TENER CAPACIDAD Y TAMAÑO ADECUADOS

- La ruta no debe disminuir a lo largo de la dirección del trayecto hacia la salida

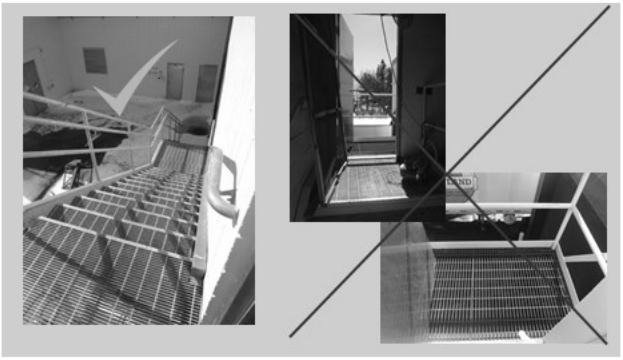
LAS RUTAS DE SALIDA DEBEN TENER CAPACIDAD Y TAMAÑO ADECUADOS



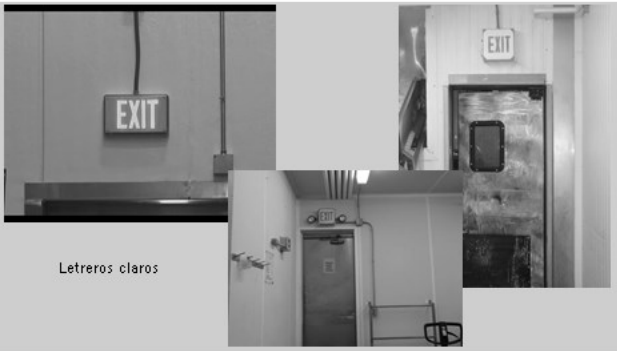
LAS RUTAS DE SALIDA DEBEN TENER CAPACIDAD Y TAMAÑO ADECUADOS



REQUISITOS PARA RUTAS DE SALIDA EXTERIORES.



SE DEBEN SEÑALAR LAS RUTAS DE SALIDA



Letreros claros

SE DEBEN SEÑALAR LAS RUTAS DE SALIDA

13 letreros en este edificio sin iluminación

SE DEBEN SEÑALAR LAS RUTAS DE SALIDA

No decoraciones u otro letreros o cosas que bloqueen la visibilidad

SE DEBEN SEÑALAR LAS RUTAS DE SALIDA

"No es salida"

REQUISITOS PARA SISTEMAS DE ALARMAS.

REQUISITOS DE MANTENIMIENTO.

- Se debe mantener materiales que retarden incendios

REQUISITOS DE MANTENIMIENTO.

REQUISITOS DE MANTENIMIENTO.

REQUISITOS DE MANTENIMIENTO.

REQUISITOS DE MANTENIMIENTO.

MANTENIMIENTO DE SALIDAS DURANTE CONSTRUCCIÓN/REPARACIÓN.

MANTENIMIENTO DE SALIDAS DURANTE CONSTRUCCIÓN/REPARACIÓN.

¿QUÉ ESTÁ MAL CON ESTA FOTO?

¿QUÉ ESTÁ MAL CON ESTA FOTO?

¿Está claro?

¡¡NO!!

¿QUÉ ESTÁ MAL CON ESTA FOTO?

¿QUÉ ESTÁ MAL CON ESTA FOTO?

RESUMEN

- El propósito de la regulación
- Definiciones
- Requisitos de la ruta de salida y salidas en una facilidad
- Requisitos de resistencia al fuego de las salidas
- Las rutas de salida deben mantenerse seguras
- Requisitos que aseguran que las salidas sean seguras y fáciles

RESUMEN

- Las rutas de salida deben tener capacidad y tamaño adecuados
- Requisitos para rutas de salida exteriores
- Se deben señalar las rutas de salida
- Requisitos para sistemas de alarmas
- Requisitos de mantenimiento
- Mantenimiento de salidas durante construcción/reparación