

THESIS

ASSESSING AN EDUCATIONAL SAFETY TRAINING SOLUTION FOR LATINO
CONSTRUCTION WORKERS

Presented by

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ABSTRACT

ASSESSING AN EDUCATIONAL SAFETY TRAINING SOLUTION FOR LATINO CONSTRUCTION WORKERS

Latino construction workers are at a higher risk of occupational injury than any other ethnic group in the United States. Inappropriate safety training is one of the leading causes behind the alarming number of workplace accidents suffered by Latinos. As the total number of Latino construction worker deaths continues to trend upwards the need for culturally appropriate training is also increasing as workers of all ethnicities have equal rights to obtain the knowledge necessary to prevent on the job injuries.

This study investigated 45 Latino construction workers in northern Colorado to determine the effectiveness of an educational video in enhancing viewer knowledge on fall protection safety, to verify that the video content and presentation was a culturally appropriate training technique and to analyze the participants' reactions. The researcher compared the participants' pre and post-video surveys on scaffolds knowledge and their reactions to the video.

The results indicate that the use of an educational video in Spanish using non-descript characters is a culturally appropriate means to educate Latino construction workers.

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CHAPTER 1 - INTRODUCTION

In the past decade the construction industry has accounted for the highest percentage of non-fatal injuries and the second highest percentage of fatal injuries experienced by Latino workers in the United States (Smith, Perry, & Moyer, 2006). Despite these alarming facts, only a small portion of health and safety research in the construction industry involves Latino workers (Brunette, 2004).

The industry standard is to educate construction workers in the United States (U.S.) using English, including Spanish speaking workers, or to take existing training manuals and translate them into Spanish (Canales, et al., 2009). It has been recognized that traditional translation methods may lead to inaccuracies (Brunette, 2005) that can prove to be misleading and even fatal (Robotham, 2001). Inappropriate safety training is one of the leading causes behind the alarming increase in workplace accidents for the Latino ethnic group as the construction industry lacks effective training tools to effectively educate Spanish speaking workers about fall protection (ASSE, 2004). This is an area of concern as Latinos experience work-related injuries at twice the rate compared to non-Latino U.S. workers (Smith, Perry, & Moyer, 2006).

Latinos, commonly referred to as Hispanics (Robinson, 1998), are the fastest growing ethnic group in the United States (Brunette, 2004). For the purpose of this paper Latino construction workers are defined as:

- Individuals who identify with the Latino ethnic group (Padilla, 1984);
- Are immigrants of South or Central America including, but not limited to: Ecuador, Argentina, Columbia, Cuba, Mexico, Peru and Puerto Rico (Canales, et al., 2009; Ennis, Rios-Vargas, & Albert, 2011); and

- Are linked by the Spanish language (Robinson, 1998). Nationwide Latinos in the construction industry are composed as follows: 58.5 percent Mexican; 28.4 percent Mexican Americans/Chicanos; 3.5 percent Cubans and 9.8 percent Puerto Rican. Percentages may vary by region (Ennis, Rios-Vargas, & Albert, 2011).

Training is defined as a planned learning experience designed to bring about lasting changes in an individual's knowledge, attitudes, or skills (Campbell, Dunnette, Lawler, & Weick, 1970) and training effectiveness is determined by assessing the amount of knowledge gained (Noe & Schmitt, 1986).

Purpose of the Study

The need for linguistically and culturally appropriate training for Latino construction workers is evident (Canales, et al., 2009) and earlier studies have shown that this ethnic population of workers has identified the use of videos in Spanish as a preferred safety training technique (Smith, Perry, & Moyer, 2006). This survey study was developed using materials sensitive to the Latino culture and examines the relationship between the use of an educational video on fall protection in Spanish; the amount of knowledge gained by Latino construction workers; and the participant's reactions.

The use of surveys in this study gives the researcher the advantage of a quick turnaround in data collection (Fowler, 2002). Personal characteristics will be divided into background information about the respondents (i.e. birth country, years in construction, education, native language, etc.); and their current awareness about the prevention of falls on a construction site. An examination of background information during Part One of this study is important as it may aid the researcher in identifying characteristics and factors contributing to differences in the level

of understanding about fall protection. Part Two of the study will evaluate the training effectiveness of the educational video on fall safety in informing the participants about the proper way to protect themselves from sustaining a fall related injury on a construction jobsite and individual reactions to the video itself. Evaluating the participants' individual reactions about the video will inform the researcher whether the video is culturally appropriate and if the workers enjoyed the training video.

The purpose of this study is to assess an educational video to determine its effectiveness in enhancing viewer knowledge on fall protection safety, to verify that it is a culturally appropriate training technique and to analyze the participant's reactions.

Fall Protection Video Overview

The video used in this study implemented a physical scale model built at a 1" = 1'-0" scale by the researcher to imitate a generic construction site including a two-story structure with safety railings on the roof and balcony, a ladder, scaffolding and a trench surrounded by a construction fence. In response to a pilot study previously carried conducted by Dr. Carla Lopez del Puerto and Dr. Carlos Evia, the characters were nondescript wooden mannequins with generic yellow hard hats and orange construction vests as to not mimic any specific ethnic groups.

The researcher used stop motion animation to create the educational training video. Stop motion animations utilizes photographs of the characters going about their daily routines, between each photograph the characters are moved creating movement when the photographs are shown in sequence (Northam, 2005). Studies have shown that semiabstract cartoons and realistic photography are well received and easily identified by Latino construction workers (Medhi,

Sagar, & Toyama, 2007). Native Spanish speaking individuals were used as the character's voices to ensure cultural authenticity as recommended by published literature (Smith, Perry, & Moyer, 2006).



Figure 1 - Example of a Photograph used in Stop Motion Animation

The validation behind the use of an educational video for training purposes is derived from the entertainment education campaign, which is based on the strategic placement of educational content in entertainment messages (Dutta, 2006). The entertainment education campaign is the practice of purposely designing and implementing a media message to both

entertain and educate the targeted audiences' knowledge about an educational issue, create favorable attitudes and change their behavior (Singhal & Rogers, 2001).

Study Description

Foreign-born workers make up approximately 15 percent of U.S. workforce (Smith, Perry, & Moyer, 2006) and according to the Bureau of Labor Statistics (BLS); Latinos accounted for 49.9 percent of the foreign born workforce in 2010 (Bureau of Labor Statistics United States Department of Labor, 2011).

The construction industry had the highest number of fatal injuries in 2010 ranging from highway incidents to explosions. Falls accounted for 14 percent of fatal work injuries in the construction industry in 2010, with over one-third involving falls from ladders or roofs (Bureau of Labor Statistics United States Department of Labor, 2011). The video used in this study focuses solely on fall protection since literature suggests that effective training presentations need to be a mix of entertainment and technical educational (Thompson, 2000). In order to cover additional safety topics the video would need to run for an estimated 30 minutes or more. The length of a longer video is potentially problematic because researchers have found that videos running for longer than five minutes on a single topic are less effective than videos with a total run time of five minutes or less (Thompson, 2000). Too much training on a single topic at once runs the risk of reducing the instructions' effectiveness resulting in a decrease in its credibility (Cekada, 2010). In 2010 OSHA revised its Outreach Training Programs' policy regarding the number of hours a student may spend in OSHA 10- and 30-hour training classes to 7.5 hours per day to prevent over training and running the risk that the workers may miss content (United States Department of Labor, 2010).

The study consists of pre and post-video surveys with questions related to the participant's knowledge on fall safety and a participant survey that covers demographic information, reactions to the video and cultural relevancy. Training techniques developed to educate Latino construction workers warrant further research, as the data available is limited (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006). This study only focuses on the use of one educational video and does not involve the evaluation of any other method and is limited to the region Northern Colorado. The state of Colorado accounts for 2.1 percent of the Latino population in the US (Ennis, Rios-Vargas, & Albert, 2011).

Research Questions

Is an educational video an effective tool to educate Latino construction workers in the United States about jobsite fall protection?

How is the use of an educational video to educate Latino construction workers culturally appropriate?

CHAPTER 2 - REVIEW OF THE LITERATURE

A significant amount of research exists regarding theories as to why Latinos suffer from a higher percentage of work-related injuries than any other ethnic group. However, only limited research exists that evaluates successful training techniques in the prevention of work-related injuries to Latino construction workers (Brunette, 2004).

The literature review is organized into the following sections; Defining the Latino Workforce, Latinos in Construction, Current Latino Training Programs and Training Techniques.

Defining the Latino Workforce

Latinos are the fastest growing segment in the U.S. work force (Center for Disease Control and Prevention, 2008; Brunette, 2005); and accounted for 49.9 percent of the foreign-born workforce in 2010 (Bureau of Labor Statistics United States Department of Labor, 2011) with 38 percent employed as laborers (Olbina, Hinze, & Ruben, 2011). Construction laborers have more than twice the fatality rate of any other occupation in the United States (Brunette, 2005); placing Latino construction workers at a higher risk of occupational injury than other ethnic groups (Olbina, Hinze, & Ruben, 2011).

Between 1990 and 2010, immigrants accounted for more than 50 percent of U.S. growth increasing foreign-born employment by 22 percent between 1996 and 2000 (Anderson, Hunting, & Welch, 2000; Ennis, Rios-Vargas, & Albert, 2011). During this time period, immigrants' share of fatal occupational injuries increased by 43 percent during a time when the overall number of fatal occupational injuries in the U.S. declined by five percent (Anderson, Hunting, & Welch, 2000). These trends have continued with fatalities of all ethnicities in construction decreasing from 20.3 percent, or 1,121 of all occupational deaths in 2002, to 16.7 percent in 2010 (Bureau of Labor Statistics United States Department of Labor, 2011; Brunette, 2004). However, with the

exception of 2002-2003, the total number of Latino construction worker deaths has trended up (Sanders-Smith, 2007) as the overall number of Latino construction workers has substantially increased in the past decade (Olbina, Hinze, & Ruben, 2011).

Two million of the 2.7 million Latino construction workers in the United States are foreign-born; 42 percent cannot speak English fluently and another 42 percent cannot speak English at all (Evia, 2011). Language barriers make communication among Spanish and English speaking workers about the importance of safety training nearly impossible since most training is only available in English (Olbina, Hinze, & Ruben, 2011).

As the Latino population in the United States continues to trend upwards the need for culturally appropriate training also increases as workers of all ethnicities have equal rights to obtain the knowledge necessary to prevent on the job injuries.

Latinos in Construction

All workers in the construction industry are faced with the inherent risk of injury regardless of their ethnicity (Anderson, Hunting, & Welch, 2000); language barriers and ineffective training can hinder a worker's understanding of potential hazards on a work site as well as the skills needed to properly complete a job in a safe manner (Smith, Perry, & Moyer, 2006; Evia, 2011; Olbina, Hinze, & Ruben, 2011). Between 1992 and 1996, 11,303 Latino workers lost their lives due to work related injuries (Center for Disease Control and Prevention, 2008) with nearly 25 percent of the occupational deaths occurring in the construction industry (Loh & Richardson, 2004). Other than agriculture, the construction industry has the highest proportion of Latino workers in the U.S. (Olbina, Hinze, & Ruben, 2011) making the construction industry a high priority when it comes to safety research.

M. Brunette reported in 2005 that 21 percent of Latino construction workers are laborers (2005) accounting for more than 38 percent of all laborers in the industry (Olbina, Hinze, & Ruben, 2011). The five most common laborer positions Latinos working in construction fill, in no significant order, have consistently been carpenters, concrete workers, painters, drywall installers and roofers (Goodrum & Dai, 2005; Brunette, 2004).

Latino culture revolves around strong family ties and workers often see other Latinos in their industry as an extended part of their own family. This leads Latino construction workers to express their concerns to their peers rather than their supervisors. Common concerns among Latino construction workers about keeping their jobs in the U.S. and avoiding potential conflicts also leads to fewer questions about safety procedures and underreporting of occupational injuries and hazardous conditions (Smith, Perry, & Moyer, 2006). Another cultural difference Latino construction workers face is their inexperience with governmental enforcement of safety regulations leading to little or no trust in the agencies' stated intentions (Brunette, 2005).

Current Latino Training Programs

While Latino construction workers continue to account for a disproportionate number of occupational injuries in the construction industry (Goodrum & Dai, 2005), research involving Latino workers is still lacking (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006; Brunette, 2004). In 2002, the construction industry was the topic of 106 funded research projects funded by the United States National Institute of Occupational Safety and Health Compendium of Construction Research conducted at the Center to Protect Workers' Rights. Only one project used Latino construction workers as the major focus (Brunette, 2004). The need for research is significant and increasing as the Latino population accounted for more than half of the total population growth in the United States between 1990 and 2010 (Ennis, Rios-Vargas,

& Albert, 2011; Anderson, Hunting, & Welch, 2000). Research is needed to determine which safety practices are most effective (Olbina, Hinze, & Ruben, 2011).

Entities who have training programs directed towards Latino workers include: Occupational Safety and Health Administration (OSHA); Construction Accident Reduction Emphasis (CARE) based in Florida; the Georgia Tech Research Institute (GTRI); National Institute for Occupational Safety and Health (NIOSH); and Working Immigrant Safety and Health Coalition (WISH) (Canales, et al., 2009).

As of 2004, OSHA has allocated more than two million dollars of new funding to efforts dedicated to Spanish and other non-English speaking workers. A large portion of this budget has been allocated towards the translation of basic documents related to worker and employer rights and responsibilities, publications and fact sheets into Spanish, as well as a new website written in Spanish (Canales, et al., 2009; United States Department of Labor, 2012).

In 1999 OSHA developed the CARE program in Florida with the hope that Latino construction workers in Florida and Georgia would begin reporting hazardous working conditions (United States Department of Labor, 2002; Canales, et al., 2009). The program evolved to include small business management training, safety and health training, and bilingual assistance specialists such as inspectors (Canales, et al., 2009).

Latino construction workers in Atlanta, Georgia suffered an astounding 61 percent of the construction fatalities in 2001. This alarming statistic led researchers at GTRI to develop safety-training materials for Latino construction workers (Becker, 2003). The study included materials on: fall protection, scaffolding, trenching and excavation, electrical hazards and materials handling (Canales, et al., 2009; Becker, 2003). In an effort to accommodate all Latino construction workers the study includes a variety of presentation medias including: posters and

hazard bulletins, pamphlets and informal and formal computer presentations (Georgia Tech Research Institute, 2004).

Working Immigrant Safety and Health Coalition (WISH) was formed in 2001 to address the health and safety of immigrant Latino workers in California with funding from the Institute for Labor and Employment (Canales, et al., 2009; University of California, Berkeley, 2006). The association set out to:

- Develop strategies and policy recommendations to improve working conditions and reduce work-related injuries and illnesses among California's immigrant workforce and,
- Develop a network of organizations that are providing training and support around health and safety issues. The network will serve to share strategies build skills, and develop and exchange materials and other information (University of California, Berkeley, 2006).

NIOSH also works to identify and reduce hazardous working conditions through research and training (Canales, et al., 2009).

Research shows a notable increase in safe work practices immediately after training (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006), which declines after the initial training, and only 10 to 15 percent of the content is retained after one year (Cekada, 2010). Selecting an appropriate teaching instrument determines effectiveness since a person's ability to retain information is directly related to the chosen training method (Thompson, 2000). Despite being the largest percentage of immigrant workers in the U.S. there is still a limited amount of research available on the effectiveness of training programs geared towards increasing safety awareness (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006). Studies by the Pew Hispanic Center have found that just one in three Latino who do not speak English go

online; only 56 percent of Latinos in the U.S. use the internet; and are less likely than non-Latinos to have internet access at home (Fox & Livingston, 2007).

Latino construction workers face cultural and language differences on a daily basis (Evia, 2011). Materials developed by OSHA, CARE, GTRI, NIOSH and WISH may be out of reach due to its computer-based presentation (Fox & Livingston, 2007). Research shows trainees of all ethnicities only retain 10 percent of what they read one year after training compared to 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).

Training Techniques

Training is fundamental to occupational safety. Primary reasons why training techniques developed for U.S. construction workers may not be effective for Latinos are:

- Different cultural backgrounds (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006; Goodrum & Dai, 2005; Brunette, 2004; Evia, 2011);
- Limited education (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006),
- Communication barriers (ASSE, 2004; Olbina, Hinze, & Ruben, 2011; Evia, 2011) and
- The lack of work experience in a country with a strong governmental regulation of the workplace, which is limited in Latin countries (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006).

The biggest challenges when developing training materials for Spanish-speaking construction workers in the United States are language and culture (Evia, 2011). Therefore, appropriate training needs to reflect the native language of the audience (Evia, 2011) and be culturally appropriate (Brunette, 2004). It is critical for safety and health training and on-the-job safety meetings to be conducted in Spanish by a Latino person (Smith, Perry, & Moyer, 2006) to

ensure that the 42 percent of foreign-born workers who do not speak English are not at an even greater disadvantage (Evia, 2011).

Only 72 percent of foreign-born workers have completed high school by the age of 25 as compared to 93 percent of the native-born workforce (Smith, Perry, & Moyer, 2006), contributing to lower literacy rates among Latinos (Nielsen, 2005). The use of English training videos with Spanish subtitles has been common practice in the industry. Such an approach has created another set of challenges for Latino workers because many are unable to read Spanish even if it is their native language (Evia, 2011).

With the help of Latino construction workers, researchers have identified the deficiencies in current Latino training programs and developed a comprehensive set of guidelines for the development of new Latino training programs (Smith, Perry, & Moyer, 2006). Materials used to aid in Latino construction workers' education should:

- Be conducted in the audience's native language;
- Demonstrate the proper use of equipment and explain why it is needed;
- Develop videos in Spanish;
- Supply graphics and statistics in Spanish;
- Include hands-on training and demonstrations;
- Utilize long training sessions with refresher trainings;
- Employ Spanish speaking trainers;
- Integrate culturally appropriate materials;
- Avoid the use of direct English to Spanish translation and
- Collaborate with a native speaking Spanish translator with in-depth knowledge of the subject (Brunette, 2005; Smith, Perry, & Moyer, 2006).

Latino workers are more responsive to group learning environments rather than individual training sessions (Smith, Perry, & Moyer, 2006). They prefer the use of Latino trainers who are native Spanish speakers, enjoy the use of Latino cartoon characters in videos

(Brunette, 2005) and benefit from mentor programs that team them up with experienced, bilingual, well-trained coworkers (Olbina, Hinze, & Ruben, 2011).

CHAPTER 3 - METHODOLOGY

The proposed study was a follow-up of a pilot study conducted by Dr. Carla Lopez del Puerto and Dr. Carlos Evia (2011) *Assessing Education Entertainment Safety Training Solutions for Spanish Speaking Construction Workers*. Their study developed and utilized surveys that collected the participants' demographic information, video reactions and knowledge through pre and post-video surveys. Survey research provided Dr. Lopez del Puerto and Dr. Evia with a qualitative description of the participant's reactions and a quantitative analysis of their demographics and knowledge gained. The use of a survey allowed the researchers to gather in a short time period while maintaining consistent research practices to ensure an adequate response rate in analyzing the effectiveness of educational safety training with immediate feedback (Creswell, 2009).

The previous study was assessed by Spanish-speaking construction workers in the summer of 2011 and was presented at the 2012 American Society for Safety Engineering annual conference in June held in Denver, Colorado.

Research Design

The methodology used for this research project is based on a mixed methods research design using a concurrent triangulation strategy which is an approach to inquiry that utilizes both qualitative and quantitative forms of research concurrently (Creswell, 2009; Creswell & Plano-Clark, 2007). The use concurrent triangulation approach allows the researcher to collect both qualitative and quantitative data concurrently to determine if there is convergence, differences or a combination of both (Creswell, 2009). A mixed methods approach is appropriate in this study since it allows the collection and analysis of both quantitative and qualitative data in tandem strengthening the overall study (Creswell & Plano-Clark, 2007).

The methodological approach incorporated the use of an educational video and pre and post-video surveys (APPENDIX B) consisting of yes or no questions and open ended questions which examined the participant's knowledge gained on fall protection, their demographic information and their reactions to the video. Surveys allowed for a quantitative description of trends, attitudes, or opinions of a population by studying only a sample and a qualitative analysis of the research process (Creswell, 2009).

The information gathered via the self-administered questionnaires provided the researcher with the information necessary to determine: the relative effectiveness of this training technique, if the video was culturally appropriate and the participant's reactions. It also gave insight into whether or not the workers' demographics play a role in the outcome of this study.

Population, Sample and Participants

Participation in this study was voluntary and the goal was to survey a minimum of 30 Latino construction workers in the Northern Colorado region both before and after viewing the Spanish educational video on fall protection. Construction firms were recruited through existing relationships with Colorado State University's Construction Management Program and were contacted by phone to ask for their participation in the study. Once the respective construction firm granted permission for the researcher to survey their employees a time was scheduled for the researcher to travel to their office. During the meeting the researcher showed the safety managers the video and allowed them to review the surveys that would be administered to the participants. After the initial meeting a time was scheduled for the researcher to participate in the company's next scheduled safety meeting and conduct their research.

Participants of the study were recruited through convenience sampling and were employees of the participating construction firms. All workers were welcome to participate regardless of their ethnicity, age, trade, etc. The only workers excluded from participating in this study were those who did not speak Spanish. Each worker was given an Informed Consent to Participate in Study in his or her native language (APPENDIX C).

Script Development

The original script was developed by Dr. Evia and his research team at Virginia Tech with participatory input from Latino construction workers and their supervisors (Evia, 2011). The script was adapted by Dr. Lopez del Puerto to ensure it complied with Occupational Safety and Health Administration (OSHA) regulations.

The goal behind redeveloping the script for this study was to implement changes suggested by the pilot study participants to ensure it accommodated their specific needs and limitations while complying with OSHA regulations.

Survey Outline

The purpose of the pre and post-video surveys was to evaluate the amount of knowledge gained by Latino construction workers in Colorado before and after viewing the educational video to determine the amount of knowledge gained, establish if the video is culturally appropriate and evaluate the participants' reactions. Areas of interest included the participants' demographics, past training experiences, fall protection knowledge, level of education and video reactions.

The pre and post-video surveys tested the participants' knowledge on fall protection (APPENDIX B) and consisted of 35 yes or no questions. Identical in content, this allowed the researcher to determine the participant's level of knowledge gained from viewing the video.

The participant survey consisted of 19 questions pertaining to the participants' demographics and 14 questions inquired about their reactions to the video and its cultural relevance. Participants responses provided data on age, main language, trade, their birth country, number of years in the industry, if participants received fall protection training at work and if the training was in their main language. Seventeen of the 19 demographic questions in Section I were multiple choice and two were open-ended. Samples of both a multiple choice and an open-ended question from the demographic survey are shown below.

If you were not born in the USA, how many years have you lived in the USA?
 Less than a year 1-3 years 4-6 years More than 7 years

Figure 2 - Multiple Choice Demographic Survey Example

What is your specific trade in construction? _____

Figure 3 - Open-ended Demographic Survey Example

Ten of the questions that evaluated the participants' reactions to the video and the cultural relevance in Section II were multiple choice and four were open ended. The multiple choice questions utilized a rating scale from one to five, one being the participant totally disagreed and five being they totally agreed with the corresponding statement. Examples of both are shown below.

Please assign a value from 1 to 5 to each statement, where **5** = Totally agree, **4** = Agree, **3** = Neither agree nor disagree, **2** = Disagree and **1** = Totally disagree

Scale
1. 5 4 3 2 1 I liked the video

Figure 4 - Multiple Choice Video Reaction Example

What did you like the most about the video?

Figure 5 - Open-ended Video Reaction Example

Data Collection Instruments, Variables and Materials

Dr. Lopez del Puerto and Dr. Evia developed the data collection instrument in the summer of 2011 to assess the pilot study.

When the safety managers granted permission to distribute the surveys, the researcher arrived at the office on a predetermined date and time; described the purpose of their study to the participants with the help of a translator; circulated the informed consent handouts; administered and collected the pre-video surveys; showed the video; administered the post-video surveys and the participant surveys and provided incentive money upon completion. Each participant received a \$5 cash incentive. In order to account for the cash transaction each recipient of the incentive was required to fill out a verification form, which consisted of his or her name, signature and the date. The form was kept separate from the surveys to limit the risk of the participants' identities from being revealed. Each participant was given their own paper copy of the self administered surveys in Spanish which were kept anonymous using the identification number their employer has provided.

Data Analysis Procedures

After the surveys had been completed, the results were manually entered into a Microsoft Excel spreadsheet. The raw data was then sorted and coded in preparation for analysis using StatPlus:mac. The variances between the pre and post video survey scores were analyzed using a Paired Two-Sample t-test. When an open-ended question was used, individual responses were grouped and assigned a coded number. For example, if the survey question, “In what country were you born?” was answered with “Mexico” this response will be coded as “1”. If any other participant provided “Mexico” on their survey, the same number was assigned to that response. This process was repeated until every response was assigned a code number. The pre and post-video surveys consisted of yes or no answers, “yes” answers were coded as “1” and “no” answers were coded as “0.” Questions left blank by the participants were left blank during the analysis process and scored as incorrect by default.

Once the pre and post-video survey results were coded and analyzed, the researcher explored the outliers by examining the differences and similarities between their quantitative scores and their qualitative reactions. For instance, if one respondent showed a higher or lower percentage of knowledge gain than the rest of the participants the researcher compared their reactions to the video as well as their demographics to uncover the similarities or differences. A thorough review of the pre and post video data in relation to the participant’s age, literacy rate and education was the focus of the research. By studying the participants’ demographics in-depth it allowed the researcher to determine if there were any specific factors that played a direct role in the outcome of the study.

CHAPTER 4 – RESULTS & DISCUSSION

Out of the 47 participants, all but two completed the pre and post-video surveys. The final population for the study totaled 45 participants located in the Northern Colorado region. The surveys were collected through convenience sampling at a construction company that specialized in residential and commercial roofing during their weekly safety-training meeting. All 45 of the participants who completed the pre and post-video survey were male Latino construction workers.

Demographic Results

Section I of the participant survey provided the participants' demographic information and began with the identification of the construction sector in which the participant worked in. The possible responses were residential construction and commercial construction. Eleven participants in the study marked both residential and commercial construction as the sector they worked in; these responses were coded as both. All participants in the study worked for the same roofing company that specialized in both residential and commercial construction, therefore all the participants worked in both sectors and were roofers by trade.

When asked to provide their age, the participants were given four possible answers: 30 or younger, between 31 and 40, between 41 and 50 and older than 50 years of age. Out of the 40 participants who responded, 78 percent reported that they were younger than 40 years old. This finding is consistent with published literature which reports that 63 percent of the Latino workforce in the United States is between 18 and 41 years of age (Fox & Livingston, 2007).

Table 1 - Age of Participants

Age	N	(%)
30 or younger	12	30%
Between 31 and 40	19	48%
Between 41 and 50	7	17%
Older than 50	2	5%

One hundred percent of the participants of the study were male. This data is consistent with demographic data in the construction industry. Females make up less than five percent of laborers and less than 10 percent of all workers in the construction industry (Catalyst, 2012; United States Department of Labor, 1999).

When asked to provide their main language, 98 percent of the responding participants reported that their main language was Spanish. Only two percent of the study population identified English as their main language.

Out of the 40 participants who responded when asked to identify their birth country, 93 percent reported that they were born in Mexico; five percent reported they were born in the United States (US) and two percent were born in Bolivia. This finding is consistent with other investigator's findings, which identified that 60 percent of Latinos were born outside the US (Fox & Livingston, 2007; Loh & Richardson, 2004).

In addition to providing their birth country the participants provided the number of years they had lived in the US if they were not born in another country. Possible responses were: less than a year, 1-3 years, 4-6 years and more than 7 years. Out of the 37 responding participants, 92 percent reported they had lived in the US for more than seven years and the remaining eight percent had lived in the US between four and six years.

Out of the 37 participants who responded to how many years they worked in construction in their birth country, 46 percent reported that they had less than one year or no construction experience in their country of origin. These results were in line with the published work, which reports that 51 percent of Latino workers had less than one year of experience in construction prior to moving to the US (Canales, et al., 2009).

Table 2 - Years in construction in country of origin

Years in construction in country of origin	N	(%)
I didn't work in construction	15	40%
Less than a year	2	6%
1-3 years	3	8%
4-6 years	4	11%
More than 7 years	13	35%

Ninety-eight percent of the 40 participants who provided a response when asked how many years they had worked in construction while living in the US responded with between four and six years or more than seven years of experience.

Out of the 39 participants who provided their highest academic degree, 83 percent reported that they did not complete high school. The published work reports a significantly lower number of Latinos who have not finished high school at 41 percent (Fox & Livingston, 2007). The average education degree earned by the participants who responded was the completion of middle school.

Table 3 - Highest academic degree

Highest academic degree	N	(%)
Attended elementary school, did not graduate	3	8%
Graduated elementary school	5	13%
Attended middle school, did not graduate	2	5%
Graduated middle school	13	33%
Attended high school, did not graduate	9	24%
Graduated high school	3	8%
Vocational or technical school	1	2%
Attended a University, did not graduate	2	5%
Graduated from a University	1	2%

One hundred percent of the responsive participants had received safety training in the past year. Ninety-two percent had received more than five hours of training and 76 percent indicated the training they received included information on scaffolding. When asked if the training they received was in their main language, 95 percent responded that the training was not presented in their main language. The published literature reports a significantly higher level of safety trainings delivered in the worker’s native language at 20 percent (Olbina, Hinze, & Ruben, 2011).

When asked to self-report their ability to speak and read English the participants were given a scale of: Excellent, Very Good, Good, Regular and Bad. Eighty- five percent of the participants who provided their ability to speak English reported their ability as regular or bad. These results are consistent with the findings of other investigators that identified over one-third of Latino construction workers only spoke Spanish (Olbina, Hinze, & Ruben, 2011; Evia, 2011). Out of the 42 participants who responded to their ability to read English, 48 percent reported their ability as regular and 40 percent reported their ability to read English was bad. This finding

is consistent with published literature reports that 42 percent of foreign-born Latino worker cannot read English at all (Evia, 2011). In response to their ability to read Spanish 37 percent responded that their ability to read Spanish was excellent. The remaining participant's responses varied equally from regular to very good. It is important to note that published investigations report that a small, but significant number of Latino workers are illiterate in their own language (Brunette, 2004) and that individuals with lower literacy rates can read, but have difficulty in doing so (Nielsen, 2005).

Table 4 – Self-reported Language Abilities

Ability to speak English	N	(%)
Excellent	1	3%
Very Good	1	3%
Good	3	7%
Regular	26	63%
Bad	10	24%
Ability to read English	N	(%)
Excellent	1	2%
Very Good	2	5%
Good	2	5%
Regular	20	48%
Bad	17	40%
Ability to read Spanish	N	(%)
Excellent	15	37%
Very Good	9	21%
Good	9	21%
Regular	9	21%
Bad	-	-

Video Reactions

Section II of the participant survey focused on the participant's reactions to the video. The participants were given a rating scale of "5 = Totally agree," "4 = Agree," "3 = Neither

agree nor disagree,” “2 = Disagree” or “1 = Totally disagree” as a metric of measuring their reactions.

When asked if they “Liked the video” 41 participants provided responses; 93 percent agreed with the statement and seven percent neither agreed nor disagreed. Overall, the participants agreed with the statement, rating the video an average score of 4.65 out of a possible 5.0.

Ninety-five percent of the 41 participants who responded to the statement “The video was interesting” agreed with the statement and five percent neither agreed nor disagreed. On the given scale of 1-5 points, the participants scored the video an average of 4.73 out of 5.0, expressing that they agreed the video was interesting.

Out of the 40 participants who provided responses to whether “The video was easy to follow and understand,” 100 percent of the participants agreed with 86 percent responding they totally agreed. Overall, the participants agreed with the statement, rating the video an average score of 4.85 out of a possible 5.0.

Thirty-nine participants responded to whether they agreed with the statement “The video had a good balance of knowledge and entertainment.” 93 percent of the participants agreed, two percent neither agreed nor disagreed and five percent disagreed. Overall the participants gave the video an average score of 4.56/5.0 for balance.

The final assessment for the participants’ reaction to the video provided whether or not they would recommend the video to their peers or supervisors. Forty-two participants responded giving the video a score of 4.70/5.0. Ninety-five percent of the participants agreed they would

recommend the video with 75 percent responding they totally agreed. The remaining five percent of the participants neither agreed nor disagreed.

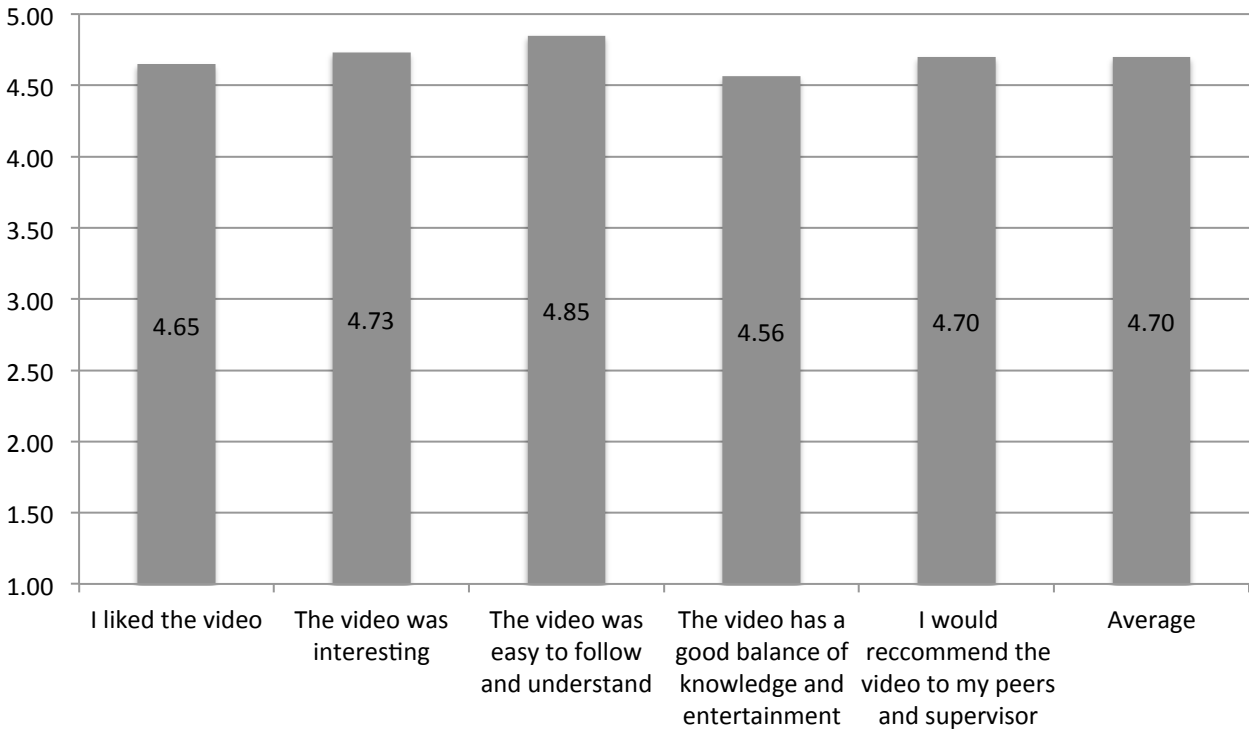


Figure 6 - Video Reactions

Following the completion of the training, the participants were asked to complete a series of written questions: (1) what did you like the most about the video; (2) what did you like least about the video and (3) what would you change about the video.

Thirty-nine participants provided written responses describing what they liked most about the video; 10 participants simply stated that they liked “all” of the video. Eleven participants liked the safety element of the video providing answers such as “the safety instructions,” that they liked “the way they always talk about safety at work,” how “everyone speaks of job safety,” and the way the characters “speak up about safety.” Other noteworthy answers included “easy to understand with humor” and that “everything was in my language.”

The participants' written reactions to what they liked most about the video were consistent with published data which suggests that on the job safety training be conducted in their main language by a native speaker (Smith, Perry, & Moyer, 2006).

The second written question provided written answers on what the participants liked least about the video. Out of the 27 participants who responded, four stated they did not dislike anything about the video responding with "nothing," I "liked everything" or that "it seemed appropriate." Another common response was "volume" or "audio" as they did not like the volume of the video and thought it was not loud enough for the participants to hear from a distance. One participant disliked the length of the video responding that the thing they liked the least was that the video was "very short." Another participant disliked that the video "only talked about scaffolding" and one participant liked the "worker insecurity" the least. The most common topic of the answers provided by the participants on what they liked least about the video was in reference to the characters. Seven participants disliked the "characters" in general, the "accent" of the characters or their "emotions."

Out of the 33 participants who responded when asked to write what they would change about the video, 23 responded that they would change "nothing." Five participants would change the "characters" either in general or so "that they move their bodies" or show "respect" and "not use nicknames." Another participant would change the video to make it "longer" by adding "a little more on stairs."

Cultural Relevance

The third and final section of the participant survey focused on the cultural relevance of the fall protection video. Using the same rating scale as the video reactions section of "5 =

Totally agree,” “4 = Agree,” “3 = Neither agree nor disagree,” “2 = Disagree” or “1 = Totally disagree” as a metric to measure if the video was culturally relevant.

Out of the 38 participants who provided responses to whether “The characters in the video were like my colleagues and me,” 79 percent of the participants agreed. Thirteen percent of the participants neither agreed nor disagreed and eight percent disagreed. Overall, the participants agreed with the statement, rating the video an average score of 4.18 out of a possible 5.0. This is found to be inconsistent with the published work that supported the use of nondescript wooden mannequins reports by stating that the suggestion to use cartoon like characters to represent Latino construction workers came from the workers themselves (Brunette, 2005; Evia, 2011).

When asked if the “events in the video look like things that have happened to me at work” 37 participants provided responses; 87 percent agreed with the statement, while ten percent neither agreed nor disagreed and three percent disagreed. Overall, the participants agreed with the statement, rating the video an average score of 4.45 out of a possible 5.0.

Eighty-seven percent of the 39 participants who responded to the statement “I have been or worked in setting like the ones represented in the video” agreed with the statement. Ten percent neither agreed nor disagreed and three percent disagreed. On the given scale of 1-5 points, the participants scored the video an average of 4.44 out of 5.0, expressing they had been or worked in a setting similar that the one portrayed in the video.

When asked if “events from the video could take place this year” 38 participants provided responses; 79 percent agreed with the statement and 13 percent neither agreed nor disagreed.

Eight percent of the participants reported that they totally disagreed. Overall, the participants agreed with the statement, rating the video an average score of 4.18 out of a possible 5.0.

The final assessment to determine if the video was culturally relevant provided whether or not the participants agreed, “the characters in the video talked like my colleagues and me.” Thirty-eight participants responded giving the characters in the video talked like the participants and their colleagues, giving video a score of 4.03/5.0. Out of the 38 responses, 68 percent of the participants agreed the characters talked like themselves and their colleagues while 18 percent neither agreed nor disagreed and 14 percent disagreed.

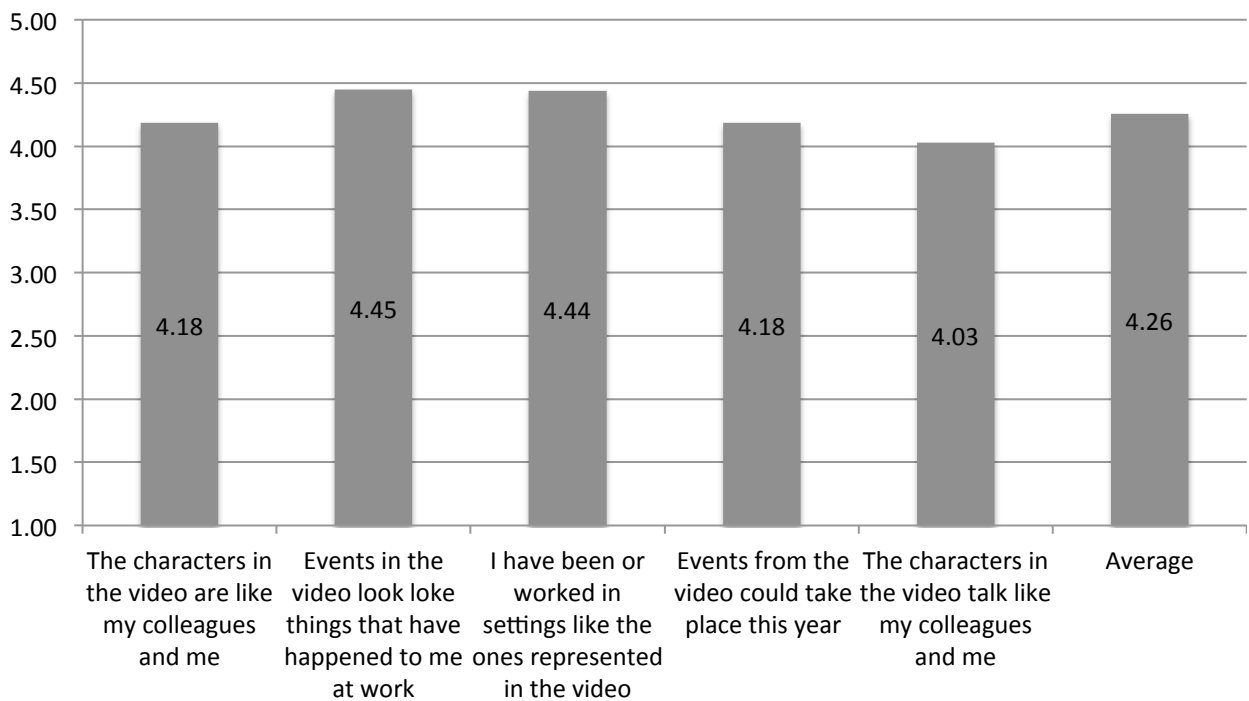


Figure 7 - Cultural Relevance

At the end of the survey each participant was given room for additional comments. All of the participants who provided more input gave positive and constructive responses. One

participant shared that they thought the video was “good for orientation” and another asked for “more examples.”

Knowledge Gain

The Scaffolds Knowledge Pre and Post-Video Tests were surveys with identical content and contained 35 yes or no questions. The analysis on the results determined that the mean score on the Scaffolds Knowledge Pre-Video Test was 54 percent and the mean score on the same test given immediately after the participants viewed the educational video was also 54 percent. A paired samples t-test confirmed that the knowledge of the participants neither increased nor decreased from the pre to post-video test.

The results for all of the 35 questions can be seen in Table 6, which contains each question with the participant’s responses to both the pre and post-video survey, the survey key providing the correct response, the score for each question both pre and post-video and the percentage of knowledge gained or in some instances, lost.

Table 5 – Descriptive Results

	Pre-Video				Post-Video				Key		Score				Gain or Loss
	Yes		No		Yes		No		Yes	No	Pre		Post		Δ
	N	(%)	N	(%)	N	(%)	N	(%)			N	(%)	N	(%)	(%)
Harnesses are necessary when working:															
6 feet (1.80 meters) high	39	98%	1	2%	39	98%	1	2%	✓		39	98%	39	98%	-
Near wall or floor openings	19	70%	8	30%	20	74%	7	26%	✓		19	70%	20	74%	4%
6 feet (1.80 meters) high or above dangerous	25	93%	2	7%	25	93%	2	7%	✓		25	93%	25	93%	-
Always, even though you may be working at 3 feet (1 meter) high	22	61%	14	39%	23	72%	9	28%		✓	14	39%	9	28%	-11%
Harnesses:															
Stop falls	39	95%	2	5%	31	97%	1	3%	✓		39	95%	31	97%	2%
Prevent falls	25	78%	7	22%	25	78%	7	22%		✓	7	22%	7	22%	-
Are necessary to keep workers safe	38	97%	1	3%	38	100%	-	-	✓		38	97%	38	100%	3%
If strong winds or storms are present, workers can work on scaffolds:															
If a competent person, such as a supervisor has determined that it is safe	19	56%	15	44%	20	67%	1	3%	✓		19	56%	20	67%	11%
Workers cannot work on scaffolds if strong winds or storms are present	10	23%	3	7%	11	27%	3	7%	✓		10	23%	11	27%	4%
Workers can only work on scaffolds when strong winds or storms are present if they are in a hurry and the project is behind schedule	3	9%	3	9%	1	4%	2	7%		✓	3	9%	2	7%	5%
It is necessary to inspect scaffolds:															
After they have been accidentally hit or damaged.	27	87%	4	13%	26	90%	3	10%	✓		27	87%	26	90%	3%
After strong rain	23	82%	5	18%	21	78%	6	22%	✓		23	82%	21	78%	-4%
Before each work shift	41	93%	3	7%	44	98%	1	2%	✓		41	93%	44	98%	5%
Once a month	8	30%	19	70%	7	27%	19	73%		✓	19	70%	9	73%	3%
Storing tools and material on scaffolds can be dangerous because:															
Tools and material add weight that can cause the scaffold to collapse	30	86%	5	14%	34	94%	2	6%	✓		30	86%	34	94%	9%
Tools and material can be accidentally kicked off the scaffold and hurt other workers	38	93%	3	7%	34	97%	1	3%	✓		38	93%	34	97%	4%
It is OK to store tools and material on scaffolds as long as you are careful	15	43%	20	57%	7	27%	19	73%		✓	20	57%	19	73%	16%
One can trip on tools and material	33	97%	1	3%	27	93%	2	7%	✓		33	97%	27	93%	-4%
One can climb on scaffolds:															
At the most convenient place to climb	8	30%	19	70%	7	28%	18	72%		✓	19	70%	18	72%	2%
Only at the ladder or access point	46	100%	-	-	43	98%	1	2%	✓		46	100%	43	98%	-2%
One cannot climb on scaffolds	13	50%	13	50%	33	54%	1	4%	✓		13	50%	13	54%	4%
Before working on scaffolds, I need to have training in:															
It is not necessary to receive training to work on scaffolds	21	72%	8	28%	24	83%	5	17%		✓	8	28%	5	17%	-10%
The risks related to working on scaffolds	29	91%	3	9%	32	97%	1	3%	✓		29	91%	32	97%	6%
The adequate procedures to assemble and move scaffolds	27	93%	2	7%	31	100%	-	-	✓		27	93%	31	100%	7%
The adequate procedures to inspect and maintain scaffolds	31	100%	-	-	29	100%	-	-	✓		31	100%	29	100%	-
The maximum weight that scaffolds can hold	26	100%	-	-	24	92%	2	8%	✓		26	100%	24	92%	-8%

Scaffolds must have:														
One guardrail, approximately at waist height	3	92%	3	8%	2	93%	2	7%	✓	3	8%	2	7%	-1%
Two guardrails, one at waist height, one at knee height	3	81%	7	19%	3	87%	5	13%	✓	3	81%	3	87%	6%
Scaffolds do not need guardrails as long as you are careful	1	43%	1	57%	1	60%	1	40%	✓	1	57%	1	40%	-17%
Two guardrails, one at waist height, one at ankle height	1	40%	1	60%	1	52%	1	48%	✓	1	60%	1	48%	-12%
Access ladders on scaffolds:														
Must reach the landing platform	1	52%	1	48%	8	28%	2	72%	✓	1	48%	2	72%	24%
Must extend at least 3 feet (1 meter) beyond the landing surface	4	98%	1	2%	4	100%	-	-	✓	4	98%	4	100%	2%
Are not necessary, I can climb a scaffold wherever is easier	3	10%	2	90%	6	23%	2	77%	✓	2	90%	2	77%	-13%
An accident on a scaffold can:														
Cause my death or the death of my coworkers	4	100%	-	-	4	100%	-	-	✓	4	100%	4	100%	-
Cause serious injuries that can have consequences for the rest of	3	94%	2	6%	3	100%	-	-	✓	3	94%	3	100%	6%
Total Knowledge Gain or Loss													0%	
p-value													1.0	

* p-values with a result greater than 0.05 represent a non-significant difference.

Analysis suggests no significant difference exists between the pre and post-video scores. The data was then analyzed individually for each participant to determine if there were any outliers. Table 29 contains the results for each participant and includes their pre and post-video scores and their percentage of knowledge gained or in some instances, lost.

Table 6 - Individual Participant Scores

Participant	Pre-Video Score	Post-Video Score	Δ
1	37%	37%	0%
2	17%	23%	6%
3	37%	20%	-17%
4	89%	86%	-3%
5	91%	89%	-3%
6	69%	74%	6%
7	29%	29%	0%
9	74%	77%	3%
10	63%	80%	17%
11	26%	26%	0%
12	60%	49%	-11%
13	74%	74%	0%
14	86%	77%	-9%
16	80%	69%	-11%
17	34%	29%	-6%

18	23%	23%	0%
19	34%	29%	-6%
20	74%	77%	3%
21	26%	23%	-3%
22	86%	86%	0%
23	77%	71%	-6%
24	80%	77%	-3%
25	26%	23%	-3%
26	34%	49%	14%
27	20%	26%	6%
28	40%	29%	-11%
29	74%	71%	-3%
30	54%	69%	14%
31	46%	31%	-14%
32	80%	80%	0%
33	66%	63%	-3%
34	23%	23%	0%
35	23%	26%	3%
36	66%	80%	14%
37	86%	83%	-3%
38	31%	31%	0%
39	17%	23%	6%
40	34%	17%	-17%
41	77%	80%	3%
42	54%	49%	-6%
43	43%	49%	6%
44	63%	80%	17%
45	77%	77%	0%
46	60%	69%	9%
47	66%	77%	11%
Average	54%	54%	0%

The analysis did not provide any extreme outliers, however two participants showed knowledge gains of 17 percent each with a pre-video score of 63 percent and a post-video score of 80 percent. Incidentally the analysis also provided the results of two participants who showed a rate of knowledge lost at 17 percent. Demographically the participants with the highest percentage of knowledge gained and lost had similar characteristics as each other and the study population as a whole. All four participants were born in Mexico, had self reported their ability

to read Spanish between “good” and “excellent” and had lived in the US and worked in construction for more than seven years.

Summary

The research questions for this study were: “What characteristics enhance an educational video to be an effective tool to educate Latino construction workers in the United States about jobsite fall protection?” and “How is the use of an educational video to educate Latino construction workers culturally appropriate?” The purpose was to assess an educational video to determine its effectiveness in enhancing viewer knowledge on fall protection safety, to verify that it is a culturally appropriate training technique and to analyze the participant’s reactions. This study is also intended to establish a baseline for future research on developing culturally appropriate and effective safety training materials for Latino construction workers in the United States.

Comparison to the Literature

The results of the participant survey were consistent with many of the findings in the published literature. One of the most common barriers to Latino construction worker safety training is the language barrier between the workers and their supervisors (Canales, et al., 2009), which is directly related to the lack of formal education (Fox & Livingston, 2007; Brunette, 2005) and low literacy rates (Brunette, 2004). This study supported those findings with the analysis of the questions regarding the highest academic degrees achieved by the participants, their ability to read and speak English, their ability to read Spanish and whether the training they had received in the year prior to this study was presented in their native language.

The average educational degree achieved by the participants of this study was the completion of middle school, signifying that 83 percent of the studied population does not have a high school diploma. This finding confirms that the population of Latino construction workers who participated in this study were less educated than the majority of Latinos living in the US. The published literature reports that 41 percent of Latino adults in the US have not finished high school (Fox & Livingston, 2007).

The literature also reports that 50 percent of Latino immigrants self reported their ability to speak English as poorly or not all (Brunette, 2005). The results collected in this study once again suggested that the studied population was less educated than the majority of Latinos living in the US with a higher percentage of individuals with poor English skills. Eighty-seven percent of the participants in this study self reported their ability to speak English as “regular” or “bad” and 88 percent reported their ability to read English as “regular” or “bad.”

Ninety-eight percent of the participants in this study reported their main language as Spanish, when asked to rate their ability to read Spanish the average response was “very good.” This finding is consistent with the published literature, which reports that a small, but significant, portion of Latino construction workers are illiterate in their own language (Brunette, 2004).

The educational training video and surveys utilized in this study were presented in Spanish in response to the literature that reports the need for linguistically and culturally appropriate training materials for Latino construction workers (Brunette, 2004). The participants of this study reinforced this need by providing information about the training they have received. Ninety-five percent of the participants reported that the safety training they received in the last year was not presented in their main language.

Research conducted on the participants' reactions to the video and its cultural relevancy also supported the published literature. One of the published techniques to the development of an effective training video was to leave a lasting impression by creating a training that was somewhere between pure entertainment and a "snoozer" (Thompson, 2000). This study implemented this suggestion and the participants' reactions supported this technique with the analysis of whether they like the video. The participants gave the video a score of 4.65/5.0 in strong agreement to the statement "I liked the video" and backed their reactions with positive statements such as: I liked how the video was "easy to understand with humor" and "the way the characters always talk about safety at work."

Published literature suggests the use of native speakers as a means for being achieving cultural relevancy (Canales, et al., 2009) and the use of cartoon characters to represent Latino workers (Brunette, 2005), which are found to be identifiable participants with a diverse educational background (Medhi, Sagar, & Toyama, 2007). This study followed these suggestions and found them to be appropriate based on the analysis of the participants' responses. The participants gave the video an overall rating of 4.26 out of 5.0 for culturally relevancy signifying that they agreed with the way Latinos were portrayed in the video.

Limitations

This study had numerous limitations. The study was conducted at a single company in northern Colorado and may not represent Latino construction workers at a different company or in other regions of the country. Colorado is home to approximately 2 percent of the Latino population in the US (Bureau of Labor Statistics United States Department of Labor, 2011) making it impossible to make generalizations for the population as a whole. In addition, the

study was limited to the maximum value of $N = 45$. The sample was collected through convenience sampling using a company who had an existing relationship with the university rather than by random selection, which might have represented a broader array of participants. There may be a better method for collecting the pre and post video data to account for the low literacy rate of the targeted population. The researcher's inability to speak Spanish hindered communication between the researcher and participants, requiring the use of a translator. One of the most significant limitations to this study was the reliance on self-reported data by the participants. Self-reported data that is not independently verified typically has a high chance of error as individuals may provide information they perceive as socially desirable (Evans & Crawford, 2000). The information that was self-reported by the participants may have also been impacted by recall bias where a participant reports information they recall and believe to be correct even though it may be false (Evans & Crawford, 2000).

Conclusions

The demographic survey provided data stating 92 percent of the participants received more than five hours of safety training in the past year and that 76 percent of the participants reported that the training they received did not include training on scaffolding. Given this information the researcher expected to see a significant difference between the scores of the pre and post-video surveys.

This study demonstrates that Latino construction workers at a roofing company in the northern Colorado region liked the use of an educational video as a method of training and thought the video was culturally appropriate. However, the positive reactions to the study are not supported by a significant amount of knowledge gained after viewing the educational video. Of

most concern to the researcher is the absence of knowledge gained by the participants and its relation to the lack of formal education. As a whole, the participants' average level of education was drastically lower than the reported statistic that only 41 percent of Latinos in the US have not completed high school (Fox & Livingston, 2007) as 83 percent of the participants in this study did not obtain a high school diploma. Published literature involving the study of literacy rates reports that an individual's reading level is on average four grades below their completed year of schooling (Baker, Parker, Williams, Clark, & Nurss, 1997). The average education of the participants in this study was the completion of middle school, effectively estimating an associated literacy rate equal to the second or third grade level. Individuals with lower literacy rates can read, but often have difficulty doing so and cannot understand text simply by glancing at it; they must read it word for word (Nielsen, 2005). On average, the participants in this study self-reported their ability to read Spanish as "good." Without a means of verifying the participants' responses the researcher must take into consideration there is a strong tendency for certain factors to influence the ability or willingness of an individual to self-report less than desirable results (Evans & Crawford, 2000).

The researcher in this study finds the use of an educational video culturally appropriate to educate Latino construction workers with the use of native Spanish speakers and nondescript wooden mannequins as the characters. Without further research it is unclear which characteristics enhance an educational video to be an effective training tool to educate Latino construction workers, as this study did not result in a significant amount of knowledge gained by the participants.

The number of Latinos workers in the construction industry is continually increasing and the need for effective training techniques is critical as the difference between effective and

ineffective training may lead to unsafe behaviors that result in death, injury, pain and suffering and lost profits (Robotham, 2001).

Future Studies

Future studies should be directed towards the development of an alternative means of collecting the participants' responses, such as verbal survey collection, to the pre and post-video knowledge surveys to determine if the participants' literacy rate is correlated to their amount of knowledge gained. Future research could be used to determine if the use of verbal surveys conducted by a Spanish-speaking researcher in place of the written versions could provide a significant difference in the observed amount of knowledge gained. A text free means of collecting data such as verbal questions and responses has the potential to be a useful application for an illiterate or semiliterate participant in a study to provide their responses (Medhi, Sagar, & Toyama, 2007). Published literature suggests that study participants should be given the option of having survey questions read to them by the examiner. The offer should be made to the entire group of participants at the beginning of the study to avoid possible embarrassment (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006). To limit a future study's reliance on self-reported data the participant's ability to read Spanish should be tested to prevent the false positives that occur when individuals over report their abilities (Evans & Crawford, 2000).

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APPENDIX A

English Video Script

Written by: Carlos Evia, Ph.D.; Carla Lopez del Puerto, Ph.D.; Megan Miller; Latino Construction Workers; Matt Sharp; and Jessica Broadus

Fall Protection

Scene 1

Foreman: Let's see, Patotas.... Prepare the scaffold in order to repair the window on the second floor.

Patotas: Yes boss, it's almost ready.

Isidro: Hey Patotas, you're not going to put on your harness before you climb the scaffold?

Patotas: Look Isidro, I'm only going to the second floor. It's not that high.

Foreman: You have to wear your harness at any height of more than 6 feet or 1.80 meters

Patotas: Falling from a scaffold can be very dangerous.

Scene 2

ISIDRO starts to climb ladder (No Hardhat)

Foreman: Don't forget your hardhat Isidro!

Isidro: Thanks Boss, I took it off during lunch.

Patotas: You need be very careful when using a ladder Isidro; you can fall from more than just scaffolds.

Foreman: That's a very good point Patotas, it's important to be careful on ladders and the roof as well. **Isidro:** Thanks Patotas now I'll never get my work done.

Foreman: This is a very serious topic Isidro and we want to make sure we do everything we can to prevent falls on the worksite.

Patotas: Boss, why doesn't Isidro have to wear a harness too?

Foreman: That's a good question Patotas. We took the extra time to install the guardrail on the roof for fall protection. If we didn't install it he would have to wear a harness too.

Isidro: I sure am glad we installed the railing then Boss!

Patotas: Let's get back to work; it looks like it might rain.

Scene 3

Foreman: Isidro, be careful on the roof. You shouldn't be on the roof when it is raining.

Isidro: I know boss, I am just going to finish some work.

Patotas: Just get down from the roof and finish later.

Foreman: I agree. I want to make sure my workers are safe and can go home to their families in one piece every day.

Isidro:

Scene 4

Patotas: I suppose if it is important for Isidro to clean up his work area I should clean my scaffolding off too.

Foreman: Yes you should Patotas, for your own safety and the safety of others. If the scaffold is too heavy it can break and things you have on there can fall on your fellow workers and hurt them.

Patotas: I don't want to cause any accidents; I'll get right on it.

Scene 5

Isidro: Man, we finished just in time! Look how close those clouds are now

Patotas: We sure did Isidro, now when it clears up we can go back to work safely since we have had a refresher on how to prevent falls.

Scene 6

Foreman: Now that our jobsite is clean on the outside let's go work inside to stay out of the rain.

Maria: Boss, you forgot to mention the danger of falling into trenches and holes too!

Foreman: Thank you Maria! It's the same rules for holes deeper than 6 feet or 2 meters. When we start work on the excavation next week you need to be very careful.

Maria: Do you use barricades around the holes too?

Foreman: We do. That helps to protect the workers inside the trenches and holes. We also cover holes when we're not working in them so that no one accidentally falls in.

Patotas: Sounds like a good idea to me.

Foreman: So, help me spread the word to the other workers. We need to make sure everyone is following the safety rules to prevent falls.

Isidro: You can count on us boss.

Spanish Video Script

Translated by: Carlos Evia

Caidas

Scene 1

Foreman: A ver, Patotas... Prepara el andamio para que reparemos la ventana del segundo piso.

Patotas: Sí jefe, ya está casi listo.

Isidro: Oye Patotas, ¿no te vas a poner el arnés antes de subir al andamio?

Patotas: Ay Isidro, si nomás voy al segundo piso. No está tan alto.

Foreman: Pero tienes que ponerte el arnés a cualquier altura mayor a 6 pies o 2 metros, Patotas. Caerse de un andamio puede ser muy peligroso.

Scene 2

ISIDRO starts to climb ladder (No Hardhat)

Foreman: ¡Que no se te olvide el casco, Patotas!

Isidro: Gracias, jefe. Me lo quité a la hora de la comida.

Patotas: Tienes que tener mucho cuidado al usar escaleras, ISIDRO. No todas las caídas pasan cuando los trabajadores usan andamios.

Foreman: Muy bien, PATOTAS. Es importante tener cuidado en los andamios y en las escaleras también.

Isidro: Gracias Patotas. Ahora sí me va a salir bien el trabajo.

Foreman: Este es un asunto muy serio, Patotas. Tenemos que hacer todo lo posible para evitar las caídas en el sitio de trabajo.

Patotas: Jefe, pero el Isidro no tiene arnés. ¿Por qué yo sí y él no?

Foreman: Buena pregunta, Patotas. Porque nos tomamos la precaución de instalar barandales en el techo para protegernos contra caídas. Si no tuvieramos los barandales, el tendría que usar un arnés también.

Isidro: ¡Qué bueno que instalamos los barandales, jefe!

Patotas: Vamos a seguir trabajando, porque parece que va a llover.

Scene 3

Foreman: Isidro, ten mucho cuidado ahí en el techo. No debes estar en el techo si empieza a llover.

Isidro: Lo sé, jefe. Nomás termino esto y me bajo.

Patotas: Mejor te bajas de una vez y terminas luego, porque ya está lloviendo.

Foreman: Es cierto. Lo más importante es que los trabajadores estén seguros y puedan regresar a sus casas completos para estar con sus familias.

Isidro:

Scene 4

Patotas: Creo que así como el Isidro dice que es importante limpiar su área de trabajo, yo debería también limpiar mi andamio.

Foreman: Claro que sí, Patotas. Debes limpiar el andamio por tu seguridad y la de los demás. Si el andamio tiene mucho peso encima se puede romper y las cosas que tienes ahí arriba pueden caer sobre tus compañeros y lastimarlos.

Patotas: No, pues no quiero casuar accidentes. A limpiar se ha dicho.

Scene 5

Isidro: Terminamos justo a tiempo, compadre. Mira que cerca están esas nubs.

Patotas: Así es, Isidro. Ahorita que se despeje el cielo podemos seguir trabajando seguros y de paso recordamos puntos importantes sobre prevención de caídas.

Scene 6

Foreman: Ahora que ya está todo limpio aquí afuera, vamos a trabajar en el interior para protegernos de la lluvia.

Maria: Jefe, se le olvidó mencionar los peligros relacionados con las caídas en zanjas y agujeros de excavaciones.

Foreman: ¡Gracias, Maria! Las mismas reglas se aplican a zanjas y excavaciones con más de 6 pies o 2 metros de profundidas. Cuando comencemos con las excavaciones la semana próxima tendremos que trabajar con mucha precaución.

Maria: ¿Y vamos a poner barricadas en las excavaciones también?

Foreman: Por supuesto. Las barricadas ayudan a proteger a los trabajadores que están dentro de las zanjas y agujeros. También vamos a tapar las excavaciones cuando nadie esté trabajando en ellas para evitar que alguien se caiga por accidente.

Patotas: Me parece buena idea.

Foreman: Así que... ayúdenme a correr la voz con los otros trabajadores. Tenemos que asegurarnos de que todos sigan las reglas de seguridad para prevenir caídas,

Isidro: Cuente con nosotros, jefe

APPENDIX B

English Pre-Video Survey

Scaffolds Knowledge
Pre-Test Video

Please answer the following:

A)	Harnesses are necessary when working	
1.	6 feet (1.80 meters) high	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Near wall or floor openings	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.	6 feet (1.80 meters) high or above dangerous	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.	Always, even though you may be working at 3 feet (1 meter) high	<input type="checkbox"/> Yes <input type="checkbox"/> No
B)	Harnesses:	
5.	Stop falls	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.	Prevent falls	<input type="checkbox"/> Yes <input type="checkbox"/> No
7.	Are necessary to keep workers safe	<input type="checkbox"/> Yes <input type="checkbox"/> No
C)	If strong winds or storms are present, workers can work on scaffolds:	
8.	If a competent person, such as a supervisor has determined that it is safe	<input type="checkbox"/> Yes <input type="checkbox"/> No
9.	Workers cannot work on scaffolds if strong winds or storms are present	<input type="checkbox"/> Yes <input type="checkbox"/> No
10.	Workers can only work on scaffolds when strong winds or storms are present if they are in a hurry and the project is behind schedule	<input type="checkbox"/> Yes <input type="checkbox"/> No
D)	It is necessary to inspect scaffolds:	
11.	After they have been accidentally hit or damaged.	<input type="checkbox"/> Yes <input type="checkbox"/> No
12.	After strong rain	<input type="checkbox"/> Yes <input type="checkbox"/> No
13.	Before each work shift	<input type="checkbox"/> Yes <input type="checkbox"/> No
14.	Once a month	<input type="checkbox"/> Yes <input type="checkbox"/> No
E)	Storing tools and material on scaffolds can be dangerous because:	
15.	Tools and material add weight that can cause the scaffold to collapse	<input type="checkbox"/> Yes <input type="checkbox"/> No
16.	Tools and material can be accidentally kicked off the scaffold and hurt other workers	<input type="checkbox"/> Yes <input type="checkbox"/> No
17.	It is OK to store tools and material on scaffolds as long as you are careful	<input type="checkbox"/> Yes <input type="checkbox"/> No
18.	One can trip on tools and material	<input type="checkbox"/> Yes <input type="checkbox"/> No

F)	One can climb on scaffolds:	
19.	At the most convenient place to climb	<input type="checkbox"/> Yes <input type="checkbox"/> No
20.	Only at the ladder or access point	<input type="checkbox"/> Yes <input type="checkbox"/> No
21.	One cannot climb on scaffolds	<input type="checkbox"/> Yes <input type="checkbox"/> No
G)	Before working on scaffolds, I need to have training in:	
22.	It is not necessary to receive training to work on scaffolds	<input type="checkbox"/> Yes <input type="checkbox"/> No
23.	The risks related to working on scaffolds	<input type="checkbox"/> Yes <input type="checkbox"/> No
24.	The adequate procedures to assemble and move scaffolds	<input type="checkbox"/> Yes <input type="checkbox"/> No
25.	The adequate procedures to inspect and maintain scaffolds	<input type="checkbox"/> Yes <input type="checkbox"/> No
26.	The maximum weight that scaffolds can hold	<input type="checkbox"/> Yes <input type="checkbox"/> No
H)	Scaffolds must have:	
27.	One guardrail, approximately at waist height	<input type="checkbox"/> Yes <input type="checkbox"/> No
28.	Two guardrails, one at waist height, one at knee height	<input type="checkbox"/> Yes <input type="checkbox"/> No
29.	Scaffolds do not need guardrails as long as you are careful	<input type="checkbox"/> Yes <input type="checkbox"/> No
30.	Two guardrails, one at waist height, one at ankle height	<input type="checkbox"/> Yes <input type="checkbox"/> No
I)	Access ladders on scaffolds:	
31.	Must reach the landing platform	<input type="checkbox"/> Yes <input type="checkbox"/> No
32.	Must extend at least 3 feet (1 meter) beyond the landing surface	<input type="checkbox"/> Yes <input type="checkbox"/> No
33.	Are not necessary, I can climb a scaffold wherever is easier	<input type="checkbox"/> Yes <input type="checkbox"/> No
J)	An accident on a scaffold can:	
34.	Cause my death or the death of my coworkers	<input type="checkbox"/> Yes <input type="checkbox"/> No
35.	Cause serious injuries that can have consequences for the rest of my life	<input type="checkbox"/> Yes <input type="checkbox"/> No

Spanish Pre-Video Survey

Conocimiento acerca de Andamios

Evaluación ANTES de ver el video

Por favor conteste las siguientes preguntas.

A)	Usar arnés es necesario cuando se está trabajando:	
1.	A seis pies (1.80 metros) de altura	<input type="checkbox"/> Si <input type="checkbox"/> No
2.	Cerca de aperturas en la pared o en el suelo	<input type="checkbox"/> Si <input type="checkbox"/> No
3.	A seis pies (1.80 metros) de altura o sobre equipo peligroso	<input type="checkbox"/> Si <input type="checkbox"/> No
4.	Siempre, aun que se esté trabajando a 3 pies (un metro) de altura	<input type="checkbox"/> Si <input type="checkbox"/> No
B)	Usar arnés:	
5.	Detiene caídas	<input type="checkbox"/> Si <input type="checkbox"/> No
6.	Previene caídas	<input type="checkbox"/> Si <input type="checkbox"/> No
7.	Es necesario para mantener a los trabajadores seguros	<input type="checkbox"/> Si <input type="checkbox"/> No
C)	Si hay vientos fuertes o tormentas, los trabajadores pueden trabajar en andamios:	
8.	Si persona competente, como el supervisor ha determinado que es seguro para los trabajadores	<input type="checkbox"/> Si <input type="checkbox"/> No
9.	Los trabajadores no pueden trabajar en andamios si hay vientos fuertes o tormentas	<input type="checkbox"/> Si <input type="checkbox"/> No
10.	Los trabajadores solo pueden trabajar en andamios si hay vientos fuertes o tormentas cuando tienen prisa por que el proyecto está	<input type="checkbox"/> Si <input type="checkbox"/> No
D)	Es necesario inspeccionar el andamio:	
11.	Después de que ha sido golpeado accidentalmente	<input type="checkbox"/> Si <input type="checkbox"/> No
12.	Después de fuertes lluvias	<input type="checkbox"/> Si <input type="checkbox"/> No
13.	Antes de cada turno de trabajo	<input type="checkbox"/> Si <input type="checkbox"/> No
14.	Una vez al mes	<input type="checkbox"/> Si <input type="checkbox"/> No
E)	Almacenar herramientas y materiales en los andamios puede ser peligroso porque:	
15.	Las herramientas y los materiales añaden peso adicional que pueden causar que el andamio se colapse.	<input type="checkbox"/> Si <input type="checkbox"/> No
16.	Las herramientas y los materiales pueden ser pateados accidentalmente y lastimar a otros trabajadores	<input type="checkbox"/> Si <input type="checkbox"/> No
17.	Está bien almacenar herramientas y materiales en los andamios mientras tengas cuidado	<input type="checkbox"/> Si <input type="checkbox"/> No
18.	Uno se puede tropezar con las herramientas o los materiales	<input type="checkbox"/> Si <input type="checkbox"/> No
F)	Se puede subir a los andamios	
19.	Desde el lugar más cómodo para subir	<input type="checkbox"/> Si <input type="checkbox"/> No

20.	Solo por la escalera o punto de acceso asignado	<input type="checkbox"/> Si	<input type="checkbox"/> No
21.	No se debe subir a los andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
G) Antes de trabajar en andamios debo recibir capacitación en:			
22.	No es necesario recibir capacitación para trabajar en andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
23.	Los riesgos de trabajar en andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
24.	Los procedimientos adecuados para ensamblar y mover andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
25.	Los procedimientos adecuados para inspeccionar y darle mantenimiento a andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
26.	El peso máximo que pueden aguantar los andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
H) Los andamios deben tener:			
27.	Un barandal a la altura de la cintura	<input type="checkbox"/> Si	<input type="checkbox"/> No
28.	Dos barandales, uno a la altura de la cintura y otro a la altura de las rodillas	<input type="checkbox"/> Si	<input type="checkbox"/> No
29.	Los andamios no necesitan barandales mientras se tenga cuidado	<input type="checkbox"/> Si	<input type="checkbox"/> No
30.	Dos barandales, uno a la altura de las rodillas y otro a la altura de los tobillos	<input type="checkbox"/> Si	<input type="checkbox"/> No
I) La escalera de acceso al andamio:			
31.	Debe llegar a la plataforma del andamio	<input type="checkbox"/> Si	<input type="checkbox"/> No
32.	Debe extenderse por lo menos 3 pies (1 metro) sobre la plataforma del andamio	<input type="checkbox"/> Si	<input type="checkbox"/> No
33.	No es necesaria, puedo subir al andamio por donde me sea más fácil	<input type="checkbox"/> Si	<input type="checkbox"/> No
J) Un accidente en un andamio puede ocasionar mi muerte o la muerte de mis compañeros de trabajo			
34.	Puede ocasionar mi muerte o la muerte de mis compañeros de trabajo	<input type="checkbox"/> Si	<input type="checkbox"/> No
35.	Puede ocasionar lesiones graves que tienen consecuencias por el resto de mi vida	<input type="checkbox"/> Si	<input type="checkbox"/> No

English Post-Video Survey

Scaffolds Knowledge
Post-Test Video

Please answer the following:

A)	Harnesses are necessary when working	
1.	6 feet (1.80 meters) high	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Near wall or floor openings	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.	6 feet (1.80 meters) high or above dangerous	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.	Always, even though you may be working at 3 feet (1 meter) high	<input type="checkbox"/> Yes <input type="checkbox"/> No
B)	Harnesses:	
5.	Stop falls	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.	Prevent falls	<input type="checkbox"/> Yes <input type="checkbox"/> No
7.	Are necessary to keep workers safe	<input type="checkbox"/> Yes <input type="checkbox"/> No
C)	If strong winds or storms are present, workers can work on scaffolds:	
8.	If a competent person, such as a supervisor has determined that it is safe	<input type="checkbox"/> Yes <input type="checkbox"/> No
9.	Workers cannot work on scaffolds if strong winds or storms are present	<input type="checkbox"/> Yes <input type="checkbox"/> No
10.	Workers can only work on scaffolds when strong winds or storms are present if they are in a hurry and the project is behind schedule	<input type="checkbox"/> Yes <input type="checkbox"/> No
D)	It is necessary to inspect scaffolds:	
11.	After they have been accidentally hit or damaged.	<input type="checkbox"/> Yes <input type="checkbox"/> No
12.	After strong rain	<input type="checkbox"/> Yes <input type="checkbox"/> No
13.	Before each work shift	<input type="checkbox"/> Yes <input type="checkbox"/> No
14.	Once a month	<input type="checkbox"/> Yes <input type="checkbox"/> No
E)	Storing tools and material on scaffolds can be dangerous because:	
15.	Tools and material add weight that can cause the scaffold to collapse	<input type="checkbox"/> Yes <input type="checkbox"/> No
16.	Tools and material can be accidentally kicked off the scaffold and hurt other workers	<input type="checkbox"/> Yes <input type="checkbox"/> No
17.	It is OK to store tools and material on scaffolds as long as you are careful	<input type="checkbox"/> Yes <input type="checkbox"/> No
18.	One can trip on tools and material	<input type="checkbox"/> Yes <input type="checkbox"/> No
F)	One can climb on scaffolds:	
19.	At the most convenient place to climb	<input type="checkbox"/> Yes <input type="checkbox"/> No

20.	Only at the ladder or access point	<input type="checkbox"/> Yes	<input type="checkbox"/> No
21.	One cannot climb on scaffolds	<input type="checkbox"/> Yes	<input type="checkbox"/> No
G)	Before working on scaffolds, I need to have training in:		
22.	It is not necessary to receive training to work on scaffolds	<input type="checkbox"/> Yes	<input type="checkbox"/> No
23.	The risks related to working on scaffolds	<input type="checkbox"/> Yes	<input type="checkbox"/> No
24.	The adequate procedures to assemble and move scaffolds	<input type="checkbox"/> Yes	<input type="checkbox"/> No
25.	The adequate procedures to inspect and maintain scaffolds	<input type="checkbox"/> Yes	<input type="checkbox"/> No
26.	The maximum weight that scaffolds can hold	<input type="checkbox"/> Yes	<input type="checkbox"/> No
H)	Scaffolds must have:		
27.	One guardrail, approximately at waist height	<input type="checkbox"/> Yes	<input type="checkbox"/> No
28.	Two guardrails, one at waist height, one at knee height	<input type="checkbox"/> Yes	<input type="checkbox"/> No
29.	Scaffolds do not need guardrails as long as you are careful	<input type="checkbox"/> Yes	<input type="checkbox"/> No
30.	Two guardrails, one at waist height, one at ankle height	<input type="checkbox"/> Yes	<input type="checkbox"/> No
I)	Access ladders on scaffolds:		
31.	Must reach the landing platform	<input type="checkbox"/> Yes	<input type="checkbox"/> No
32.	Must extend at least 3 feet (1 meter) beyond the landing surface	<input type="checkbox"/> Yes	<input type="checkbox"/> No
33.	Are not necessary, I can climb a scaffold wherever is easier	<input type="checkbox"/> Yes	<input type="checkbox"/> No
J)	An accident on a scaffold can:		
34.	Cause my death or the death of my coworkers	<input type="checkbox"/> Yes	<input type="checkbox"/> No
35.	Cause serious injuries that can have consequences for the rest of my life	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Spanish Post-Video Survey

Conocimiento acerca de Andamios

Evaluación DESPUES de ver el video

Por favor conteste las siguientes preguntas.

A)	Usar arnés es necesario cuando se está trabajando:	
1.	A seis pies (1.80 metros) de altura	<input type="checkbox"/> Si <input type="checkbox"/> No
2.	Cerca de aperturas en la pared o en el suelo	<input type="checkbox"/> Si <input type="checkbox"/> No
3.	A seis pies (1.80 metros) de altura o sobre equipo peligroso	<input type="checkbox"/> Si <input type="checkbox"/> No
4.	Siempre, aun que se esté trabajando a 3 pies (un metro) de altura	<input type="checkbox"/> Si <input type="checkbox"/> No
B)	Usar arnés:	
5.	Detiene caídas	<input type="checkbox"/> Si <input type="checkbox"/> No
6.	Previene caídas	<input type="checkbox"/> Si <input type="checkbox"/> No
7.	Es necesario para mantener a los trabajadores seguros	<input type="checkbox"/> Si <input type="checkbox"/> No
C)	Si hay vientos fuertes o tormentas, los trabajadores pueden trabajar en andamios:	
8.	Si persona competente, como el supervisor ha determinado que es seguro para los trabajadores	<input type="checkbox"/> Si <input type="checkbox"/> No
9.	Los trabajadores no pueden trabajar en andamios si hay vientos fuertes o tormentas	<input type="checkbox"/> Si <input type="checkbox"/> No
10.	Los trabajadores solo pueden trabajar en andamios si hay vientos fuertes o tormentas cuando tienen prisa por que el proyecto está	<input type="checkbox"/> Si <input type="checkbox"/> No
D)	Es necesario inspeccionar el andamio:	
11.	Después de que ha sido golpeado accidentalmente	<input type="checkbox"/> Si <input type="checkbox"/> No
12.	Después de fuertes lluvias	<input type="checkbox"/> Si <input type="checkbox"/> No
13.	Antes de cada turno de trabajo	<input type="checkbox"/> Si <input type="checkbox"/> No
14.	Una vez al mes	<input type="checkbox"/> Si <input type="checkbox"/> No
E)	Almacenar herramientas y materiales en los andamios puede ser peligroso porque:	
15.	Las herramientas y los materiales añaden peso adicional que pueden causar que el andamio se colapse.	<input type="checkbox"/> Si <input type="checkbox"/> No
16.	Las herramientas y los materiales pueden ser pateados accidentalmente y lastimar a otros trabajadores	<input type="checkbox"/> Si <input type="checkbox"/> No
17.	Está bien almacenar herramientas y materiales en los andamios mientras tengas cuidado	<input type="checkbox"/> Si <input type="checkbox"/> No
18.	Uno se puede tropezar con las herramientas o los materiales	<input type="checkbox"/> Si <input type="checkbox"/> No
F)	Se puede subir a los andamios	
19.	Desde el lugar más cómodo para subir	<input type="checkbox"/> Si <input type="checkbox"/> No

20.	Solo por la escalera o punto de acceso asignado	<input type="checkbox"/> Si	<input type="checkbox"/> No
21.	No se debe subir a los andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
G) Antes de trabajar en andamios debo recibir capacitación en:			
22.	No es necesario recibir capacitación para trabajar en andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
23.	Los riesgos de trabajar en andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
24.	Los procedimientos adecuados para ensamblar y mover andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
25.	Los procedimientos adecuados para inspeccionar y darle mantenimiento a andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
26.	El peso máximo que pueden aguantar los andamios	<input type="checkbox"/> Si	<input type="checkbox"/> No
H) Los andamios deben tener:			
27.	Un barandal a la altura de la cintura	<input type="checkbox"/> Si	<input type="checkbox"/> No
28.	Dos barandales, uno a la altura de la cintura y otro a la altura de las rodillas	<input type="checkbox"/> Si	<input type="checkbox"/> No
29.	Los andamios no necesitan barandales mientras se tenga cuidado	<input type="checkbox"/> Si	<input type="checkbox"/> No
30.	Dos barandales, uno a la altura de las rodillas y otro a la altura de los tobillos	<input type="checkbox"/> Si	<input type="checkbox"/> No
I) La escalera de acceso al andamio:			
31.	Debe llegar a la plataforma del andamio	<input type="checkbox"/> Si	<input type="checkbox"/> No
32.	Debe extenderse por lo menos 3 pies (1 metro) sobre la plataforma del andamio	<input type="checkbox"/> Si	<input type="checkbox"/> No
33.	No es necesaria, puedo subir al andamio por donde me sea más fácil	<input type="checkbox"/> Si	<input type="checkbox"/> No
J) Un accidente en un andamio puede ocasionar mi muerte o la muerte de mis compañeros de trabajo			
34.	Puede ocasionar mi muerte o la muerte de mis compañeros de trabajo	<input type="checkbox"/> Si	<input type="checkbox"/> No
35.	Puede ocasionar lesiones graves que tienen consecuencias por el resto de mi vida	<input type="checkbox"/> Si	<input type="checkbox"/> No

English Participant Survey

Section I Demographic Information

I work in: Residential Construction Commercial Construction

Age: 30 or younger Between 31 and 40 Between 41 and 50 Older than 50

Sex: Male Female

What's your main language? English Spanish Other_____

What is your specific trade in construction?: _____

In what country were you born? _____

If you were not born in the USA, how many years have you lived in the USA?

Less than a year 1-3 years 4-6 years More than 7 years

If you were not born in the USA, how many years did you work in construction in your country of origin?

I was born in the USA I didn't work in construction
 Less than a year 1-3 years 4-6 years More than 7 years

How many years have you worked in construction in the USA?

Less than a year 1-3 years 4-6 years More than 7 years

Highest academic degree:

Attended elementary school, did not graduate Graduated from elementary school
 Attended middle school, did not graduate Graduated from middle school
 Attended high school, did not graduate Graduated from high school
 Technical or vocational school Attended a university, did not graduate
 Graduated from a University

How many hours of training in construction safety have you received in the past year?

0 1 2 3 4 5+

Have you received fall protection training at work? Yes No

Did this training include information on scaffolds? Yes No

How many hours of training on fall protection have you received **in the past year**?

0 1 2 3 4 5+

Do you have an OSHA 10 hour card? Yes No

Was the training in your main language? Yes No

How would you rate your ability to speak English?
Excellent Very good Good Regular Bad

How would you rate your ability to read in English?
Excellent Very good Good Regular Bad

How would you rate your ability to read in Spanish?
Excellent Very good Good Regular Bad

Section II Reaction to video

Please assign a value from 1 to 5 to each statement, where **5** = Totally agree, **4**= Agree, **3** = Neither agree nor disagree, **2** = Disagree and **1** = Totally disagree

Scale

1.	5 4 3 2 1	I liked the video
2.	5 4 3 2 1	The video was interesting
3.	5 4 3 2 1	The video was easy to follow and understand
4.	5 4 3 2 1	The video has a good balance of knowledge and entertainment
5.	5 4 3 2 1	I would recommend the video to my peers and supervisor

What did you like the most about the video?

What did you like the least about the video?

What would you change from the video?

Section III Cultural Relevance

Scale

1.	5 4 3 2 1	The characters in the video are like my colleagues and me
2.	5 4 3 2 1	Events in the video look like things that have happened to me at work
3.	5 4 3 2 1	I have been or worked in settings like the ones represented in the video
4.	5 4 3 2 1	Events from the video could take place this year
5.	5 4 3 2 1	The characters in the video talk like my colleagues and me

Other comments about your experience in construction and how it can benefit the video

Thank you, we appreciate your participation.

Spanish Participant Survey

Sección I Información Demográfica

Trabajo en: Construcción Residencial Construcción Comercial

Edad: Menor de 30 años Entre 31 y 40 años Entre 41 y 50 años Mayor de 50 años

Sexo: Masculino Femenino

¿Cuál es su idioma principal? Inglés Español Otro _____

¿Cuál es su oficio?: _____

¿En que país nació? _____

Si no nació en Estados Unidos, ¿Cuántos años ha vivido en Estados Unidos?

Menos de un año 1-3 años 4-6 años Más de 7 años

Si no nació en Estados Unidos, ¿Cuántos años ha trabajado en construcción en su **país de nacimiento**?

Nací en Estados Unidos No trabajaba en construcción
 Menos de 1 año 1-3 años 4-6 años Más de 7 años

¿Cuántos años ha trabajado en construcción en **Estados Unidos**?

Menos de 1 año 1-3 años 4-6 años Más de 7 años

Nivel máximo de estudios:

- Empezó la escuela primaria (elementary school) pero no se graduó
- Se graduó escuela primaria (elementary school)
- Empezó la escuela secundaria (middle school) pero no se graduó
- Se graduó de la escuela secundaria (middle school)
- Empezó la escuela preparatoria (high school)
- Se graduó de la escuela preparatoria (high school)
- Escuela vocacional o técnica
- Parte de la Universidad
- Se graduó de la Universidad

¿Cuántas horas de capacitación en seguridad en la construcción ha recibido en el último año?

0 1 2 3 4 5+

¿Su capacitación incluyo instrucción sobre el uso de andamios? Si No

¿A recibido capacitación sobre protección contra caídas en su trabajo? Si No

¿Cuántas horas de capacitación sobre protección contra caídas ha recibido en el **último año**?

0 1 2 3 4 5+

¿Tiene la tarjeta de 10 horas de OSHA? Si No

La capacitación fue en el idioma que usted habla principalmente Si No

¿Cómo calificaría su habilidad para **hablar** Inglés?

Excelente Muy Buena Buena Regular Mala

¿Cómo calificaría su habilidad para **leer** Inglés?

Excelente Muy Buena Buena Regular Mala

¿Cómo calificaría su habilidad para **leer** Español?

Excelente Muy Buena Buena Regular Mala

Sección II Reacción al video

Por favor complete la siguiente encuesta y asigne un valor en la escala 1-5 para cada afirmación, donde: **5** = Totalmente de Acuerdo, **4**= De acuerdo, **3** = Ni en acuerdo ni en desacuerdo, **2** = En Desacuerdo y **1** = Totalmente en Desacuerdo

Escala

1.	5 4 3 2 1	El video me gusto
2.	5 4 3 2 1	El video me pareció interesante
3.	5 4 3 2 1	El video fue fácil de seguir y entender
4.	5 4 3 2 1	El video tiene un buen balance de educación y entretenimiento
5.	5 4 3 2 1	El video se lo recomendaría a mi jefe o a mis compañeros de trabajo

¿Qué le gusto **mas** del video?

¿Qué le gusto **menos** del video?

¿Qué cambiaria del video?

Sección III Relevancia Cultural

Escala

1.	5 4 3 2 1	Los personajes en el video son como mis compañeros de trabajo y yo.
2.	5 4 3 2 1	Los eventos en el video se parecen a cosas que han pasado en mi trabajo
3.	5 4 3 2 1	He estado o trabajado en lugares como los que aparecen en el video. Los lugares en el video me parecieron familiares.
4.	5 4 3 2 1	Los eventos en el video podrían suceder este año.
5.	5 4 3 2 1	Los personajes en el video se comunican como mis compañeros de trabajo y yo. Hablan como nosotros.

Otros Comentarios: (¿Hay algo que quiera añadir sobre su experiencia en la industria de la construcción o sobre el video?)

Gracias por completar esta encuesta, su participación es apreciada.

APPENDIX C

Informed Consent to Participate in Study - English and Spanish Versions

Informed Consent to Participate in Study



**Assessing Computer-Based Safety Training Solutions
for Hispanic Construction Workers**

Colorado State University

Virginia Tech

Department of Construction Management

Department of English

College of Applied Human Sciences
Fort Collins, Colorado 80523

College of Liberal Arts and Human Sciences
Blacksburg, VA 24061-0112

The summarized results of the survey will be published in a journal article and made available to the construction industry for educational purposes only. Neither survey participants nor the companies participating in the study will be identified. The data will not be shown to the participants' supervisor or their company.

We want to see if the safety training video teaches Hispanic workers about how to safely use scaffolds, whether or not Hispanic workers can relate to the characters in the video.

You will complete a test about scaffold safety, watch a video with your coworkers and complete the same test about scaffold safety. You will also be asked whether or not you liked the video and whether or not you think it was useful to learn about scaffold safety. This will take approximately 20 minutes.

Workers employed in commercial or residential construction in the Denver metro area of Colorado will participate in the study. **PARTICIPATION IS VOLUNTARY:** If you wish to participate in the study, please complete the survey provided and return it to the field investigator

All responses are completely anonymous; we will not collect names or other personal identifiers. There are no known risks in participating, nor are there any direct benefits. Should you become upset and feel stressed from our survey and visit, please consult your family physician or mental health professional through the Colorado Psychological Association at (303) 692-9303 or visit their website: <http://www.coloradopsych.org/default.aspx>. As a result of our survey and visit should you become concerned for your workplace safety, please contact your company safety and health representative or union representative. Thank you very much for your time and participation.

Your rights contact information: Questions about your rights may be directed to Janell Barker, Human Research Committee Administrator at (970) 491-1655. If you have any questions, please contact Principal Co-Investigator Dr. Carla Lopez de Puerto, in the Department of Construction Management at Colorado State University via email at carlalp@cahs.colostate.edu or by phone (970) 491-7960

Consentimiento informado para participar en el estudio.



**Evaluando soluciones por computadora para entrenar a
trabajadores hispanos en construcción**

Colorado State University

Virginia Tech

Department of Construction Management

Department of English

College of Applied Human Sciences
Fort Collins, Colorado 80523

College of Liberal Arts and Human Sciences
Blacksburg, VA 24061-0112

Un resumen de los resultados será publicado en una revista y compartido con la industria de la construcción con propósito educacional únicamente. Ni los participantes de la encuesta ni las compañías que participen en el estudio serán identificadas. La información no será mostrada a los supervisores de los participantes o a las compañías.

Queremos ver si el video sobre seguridad en andamios les enseña a los trabajadores Hispánicos sobre cómo usar andamios de una manera segura y ver si los trabajadores Hispánicos se pueden identificar con los personajes en el video.

Usted contestará un examen de seguridad en andamios, verá un video con sus compañeros de trabajo y contestará el mismo examen. También le preguntaremos si le gusta el video y si cree que el video es útil para aprender sobre seguridad en andamios. Todo esto durará aproximadamente 20 minutos.

Trabajadores empleados en construcción comercial o residencial en el área metropolitana de Denver, Colorado participarán en este estudio. **LA PARTICIPACIÓN ES VOLUNTARIA:** Si desea participar en este estudio, por favor complete la encuesta y devuélvala al investigador.

Todas las respuestas son completamente anónimas, no se documentarán nombres ni identificadores personales. No hay riesgos ni beneficios directos por la participación en el estudio. Muchas gracias por su tiempo y participación. Si se siente alterado o estresado por contestar nuestra encuesta y por nuestra visita, por favor consulte con su médico familiar o profesional en salud mental a través de Colorado Psychological Association (303) 692-9303 o visite su página web: <http://www.coloradopsych.org/default.aspx>. Si como resultado de nuestra encuesta y visita se preocupa de la seguridad del trabajo, por favor contacte al representante de seguridad y salud de su compañía. Muchas gracias por su tiempo y participación.

Contactos sobre sus derechos: Preguntas sobre sus derechos pueden ser dirigidas a Janell Barker, Administradora del Comité de investigación humana al (970) 491-1655. Si usted tiene alguna pregunta por favor contacte a la Dra. Carla López del Puerto, en el Departamento de Administración de la Construcción Management en Colorado State University a través del correo electrónico carlalp@cahs.colostate.edu o al teléfono (970) 491-7960.