Pre-Training to Improve Workshop Performance in Supervisor Skills: An Exploratory Study of Latino Agricultural Workers

J. Austin, A. M. Alvero, M. M. Fuchs, L. Patterson, W. K. Anger

ABSTRACT. *Employees with limited education may be excluded from advanced training due to assumptions that they might not learn rapidly. However, preparatory training may be able to overcome missing experience in education. The purpose of this study was to test the hypothesis that computer-based training (CBT) in supervisor skills of Latino agricultural workers would improve subsequent performance in a workshop designed to teach supervisor skills. Ten men born and educated in Mexico participated in the study; all spoke Spanish, the language of the training. Five participants (mean 6.4 years of education) completed supervisor skills CBT, and five participants (mean 8.2 years of education) completed hazard communication (HazCom) CBT as a control condition. Following the CBT, all participants completed a two-day face-to-face workshop on supervisory skills conducted by an experienced behavior management consultant. Although the groups did not differ in their knowledge scores on a multiple-choice test before the face-to-face workshop, after the workshop the HazCom group had a mean test score of 51.2% (SD = 8.7) while the supervisor group had a higher mean test score of 65.2% (SD = 14.3). The difference was marginally significant by a t-test (p = 0.052), and the effect size was large (d = 1.16). The results suggest that computer-based training in supervisor skills can be effective in preparing participants with limited education to learn supervisor skills from a face-to-face workshop. This result suggests that limited educational attainment is not a barrier to learning the complex knowledge required to supervise employees, that pre-training may improve learning in a workshop format, and that training may be presented effectively in a computer-based format to employees with limited education.*

Keywords. *Agriculture, Behavioral principles, Community-based participatory research (CBPR), Computer-based training, Latino workers, Supervisor skills.*

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U.S. corporations spent $58.5 billion on employee training in the most recent year with full statistics, according to *Training Magazine*'s 2007 Industry Report (*Training Magazine*, 2008). This expenditure provided two billion hours of training to an estimated 60 million employees in the U.S. (NIOSH, 1999; Van Buren and Erskine, 2002). However, it appears that the vast majority of quality research on the effectiveness of occupational training has been conducted among well-educated, mainstream U.S. Caucasian workers. For example, Cohen and Colligan (1998) specifically reviewed occupational training, and they identified only 80 (out of 2000) published reports on training methods that met basic scientific standards to allow an evaluation of their effectiveness. Only one of those 80 articles (Weigner and Lyons, 1992) identified an immigrant workforce as the participant sample, in this case from Mexico. Most of the references from two widely cited meta-analyses of the training effectiveness literature (Alliger et al., 1997; Arthur et al., 2003) reported research on managers, supervisors, and college students. Latino workers appear to be largely absent from the research cited in those reports as well, although there is a small experimental literature addressing this underserved population (e.g., Anger et al., 2004, 2006; Weinger and Lyons, 1992).

This research gap is a serious omission, since Latino workers from Mexico, Central America, and South America are the largest segment of immigrant workers in the U.S. (Mines et al., 1997; Marotta and Garcia, 2003). Of even greater concern is the lack of education in that workforce. Kamel et al. (2003) and McCauley et al. (2001a) reported that the mean formal education in the Latino agricultural workforces they studied was 4.2 years and 5.4 years, respectively.

With the growing numbers of immigrant workers, a key concern is that the educational tools designed for training U.S. workers may not be effective for Latino workers because of their different cultural background (Harrison and Hopkins, 1967). For example, Brunette (2005) recommends the creation of materials that are linguistically and culturally appropriate for Latino workers. This is concerning, as the creation of special training materials for any worker segment adds significantly to the expense and thus reduces the likelihood that companies will provide more than minimum training (although companies must be responsible for providing effective safety training). Perhaps this is one reason Latino workers in agriculture report that they receive limited occupational training (e.g., Arcury et al., 1999; Shipp et al., 2007).

With the growing training portfolio available in computer-based formats, it is clearly important to utilize these methods with immigrant workers, since creating training *de novo* for each work group is not an economically viable strategy. Computer-based training (CBT), or the delivery of training on a computer in a standardized format, has been reported in two pre- vs. post-research studies of Latino workers: one that taught orientation and plant potting to nursery workers, and another that taught pruning to orchard workers. In each case, the knowledge improvement was statistically significant and the effect sizes were large: $d = 1.02$ for the nursery workers who reported a mean of 5.4 years of education (Anger et al., 2004), and $d = 1.45$ for the orchard workers who reported 5.6 years of education (Anger et al., 2006). Both studies focused on basic skills and knowledge. Whether a CBT program could effectively teach complex work skills, such as the interpersonal interactions required of an effective supervisor, has yet to be addressed in this population. We chose supervisor skills because Latino workers would stand to benefit from learning such skills by qualifying for management positions.

Study Design

Supervisor training was provided to one group of five participants in CBT format as the independent variable, while the five participants in the control condition received hazard communication training in the same CBT format at the same time. On the following two days, all participants completed a training workshop in supervisor skills. A 20-question multiple-choice test was administered before and after the workshop, with the order of questions and answers different at the two time points. The test addressed: what are the most important parts of a supervisor's job; what steps are taken to supervise people; what is the best way to manage employees, consequences, and antecedents; goal setting; effective consequences; and behaviors vs. attitudes. Our hypothesis predicted that the workers who took the supervisor skills training before the workshop would perform better or learn more in the workshop.

Participants

Ten participants from a vineyard management company in Oregon were either current supervisors or tractor drivers who sought to become supervisors and were supported by their management to do so. When participants entered the training room, they were asked to sit in front of any of the ten computers set up, thus allowing chance to determine which computer they took the training on. What they were not told was that half of the computers had supervisor skills training and the other five had hazard communication (HazCom) training, each described below. Each of the two groups coincidentally consisted of three supervisors and two tractor drivers, with an overall mean of 3.9 years in their occupation (range = 0.7-14 years). The mean age was 27.4 years for the five participants who received HazCom training and 30.6 years for the five who received supervisor skills training. The average years of education was 8.2 (range 5 to 9) years for those receiving HazCom training and 6.2 (range 5 to 8) years for those receiving supervisor training. The greater amount of education in the HazCom group compared to the supervisor skills group was marginally significant ($t = 2.132$; $df = 8$; $p = 0.033$; one group's non-normal distribution led to a Mann-Whitney $U = 4.5$; $p = 0.058$, but none of the other demographics approached significance (t-test $p > 0.10$). All participants were educated in Mexico, and the workshop was conducted in Spanish, the primary language of all ten participants.

Methods

The CBT was presented in cTRAIN (NwETA.com; Lake Oswego, Ore.) since it offers: (1) a format based on effective behavioral education principles (e.g., self-pacing, frequent quizzes, interactive feedback, high accuracy criterion); (2) clear system training instructions, so students do not require coaching on how to use the program; (3) icon-based navigation cues always on-screen, so there are no commands to remember; and (4) Spanish-language and spoken-text options (Anger et al., 2004). The CBT was presented on laptop computers with a 9BUTTON response unit placed over the keyboard and serving as the input device. Based on anecdotal evidence, the 9BUTTON has proven important in testing or training Latino workers with limited education because it avoids the confusion of finding the 1 through 9 keys amid the 70+ keys on a QUERTY keyboard (Rohlman et al., 2003; Anger et al., 2004; Anger et al., 2006).

Both the CBT and the face-to-face training were designed by an experienced behavioral consultant (JA) as part of a Community-Based Participatory Research project (e.g., Arcury et al., 1999; McCauley et al., 2001b) funded by the National Institute for Occupational Safety and Health and guided by an advisory committee consisting of community partners, employees, and vineyard company managers. The CBT addressed topics of: how organizations work in the U.S.; what is expected of work supervisors; the importance of behavior in supervision; the basics of supervision in four steps (1. choose a behavior to watch, 2. explain behaviors to employees, 3. observe behaviors, 4. coach behaviors - reinforce or remind); and what to do if unsafe behaviors are observed to occur. The training included movies of native Spanish speakers portraying a supervisor and employee, overseen by a female Caucasian who also spoke fluent Spanish. The training and movie script were reviewed, and the script was modified substantially by these three actors to fit the Latino context in the vineyards where they worked. Both the supervisor training and the control HazCom training were given in a pilot study to 3 to 5 Latino workers, whose feedback was sought and incorporated into the revised training.

The face-to-face training was presented in Spanish by an experienced behavioral consultant (AA) fluent in Spanish in a two-day workshop of about six hours per day. The workshop techniques consisted of lecture leading to interactive discussions, small work groups or pairs to discuss problems, and question-and-answer sessions. The face-to-face training addressed: the role of the supervisor; distinguishing behavior from results; ways to identify behavior; practice in defining behavior; ways to measure behavior; how to explain to employees the preferable behavior; how to ensure that desired behavior is repeated; feedback, reinforcement, and verbal correction with an emphasis on using positive reinforcement to recognize improvements among workers; developing a work plan to address specific behaviors; how to follow up when the behavior occurs or does not occur as planned.

Results

On the pre-workshop test, mean correct responses were 46% (SD = 8.9) for the group that had received HazCom CBT and 52% (SD = 18.2) for the supervisor skills CBT group. The groups did not differ statistically on this measure ($t = 0.66$; $df = 8$; $p = 0.20$). The correlation between test performance and years of education was $r = 0.69$ in the HazCom CBT group and $r = 0.54$ in the supervisor skills CBT group.

Following the face-to-face workshop, the mean test score of the HazCom CBT group increased to 51.2% (SD = 8.7) correct responses, while the mean of the supervisor skills CBT group increased to 65.2% (SD = 14.3). This difference is marginally significant ($t = 1.841$; $df = 8$; $p = 0.052$); the effect size is large ($d = 1.16$). Inspection of the individual scores revealed that those who received supervisor skills CBT and had low initial scores improved more than did those who received HazCom CBT (fig. 1). The correlation between the post-workshop test performance and years of education was lower than before the workshop, $r = 0.28$ in the HazCom CBT group and $r = 0.45$ in the supervisor skills CBT group. The correlations were likely driven by the restricted range of years of education among both groups (5-6 and 5-9 years, respectively, for the supervisor skills and HazCom groups).

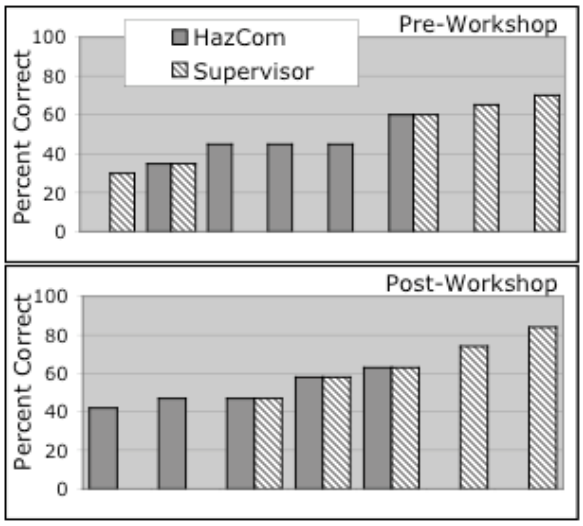

Figure 1. Distribution of individual scores in the HazCom and supervisor skills groups before and after the face-to-face workshop.

The behavioral consultant who conducted the workshop ranked the participants' excellence in verbal performance related to supervisor skills at the end of the workshop (fig. 2). The person with the lowest ranking reported the lowest years of education (5 years) of any participant, and he was believed by the research staff to be illiterate. By the end of the workshop, at the time of the ranking, research staff (MF, LP) supporting the training reported that the participants recognized that not all of them had the same training, and specifically that those who had received supervisor CBT knew the answers to some questions at the beginning of the workshop. The consultant's notes document requests by some who had received the HazCom CBT to receive the supervisor CBT after the workshop was over. Thus, the consultant, while blinded at the outset of the workshop, may have learned that some had specifically received the supervisor skills CBT; this could have influenced her ranking, despite her intent to remain blind to that influence.

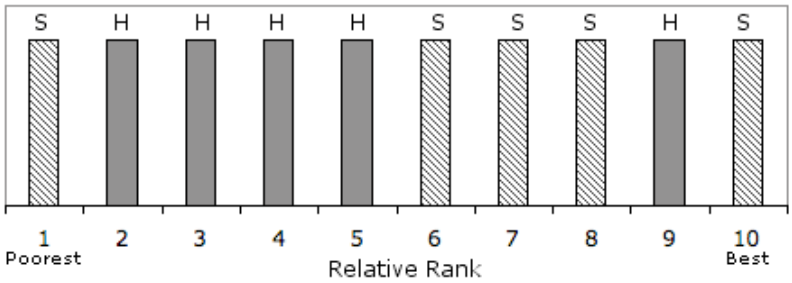

Figure 2. Relative rankings of excellence in supervisor skills knowledge at the end of the workshop, assigned by the behavioral consultant who taught the workshop. Participants identified by an "S" had completed supervisor CBT, and those identified by an "H" had completed HazCom CBT.

Discussion

The results of this study suggest that the pre-workshop CBT in supervisor skills was effective in preparing the participants to learn from the workshop ($p = 0.052$; effect size $d = 1.16$), although the CBT was not sufficient in itself to teach the concepts (based on the pre-workshop test). The distributions of participants on the pre- vs. post-workshop test (fig. 1) suggest that the two participants with low scores on the pre-workshop test improved substantially in the workshop, and that may have been the greatest impact of the CBT.

More closely related to the purpose of the study, the effect size found on the post-workshop test ($d = 1.16$) is in the middle of the mean effect sizes reported by Burke et al. (2006) in their meta-analysis of training interventions in the workplace, albeit for safety and health topics. Burke et al. (2006) calculated that the mean effect size was $d = 0.74$ for interactive CBT and $d = 1.46$ for the more-engaging face-to-face workshop training. This suggests that a Latino worker sample with 5 to 9 years of education and living in the U.S. culture for only 9 years (range = 5 to 15 years) can learn from supervisor skills CBT plus a face-to-face workshop and apply that learning to answer multiple-choice test questions on the topic. While a measure of the application of this learning in actual supervisory settings would be a far better test, the notion that immigrant Latino workers with limited education can learn from supervisor skills training is important in itself. Indeed, the Burke et al. (2006) meta-analysis suggests that, based on the effect size calculations, this combination of CBT and interactive workshop training is as useful for this Latino population with limited education as it is for mainstream U.S. populations.

What is not clear, it should be said, is if the CBT and the workshop improved the participants' knowledge enough that their supervisory performance would improve in the workplace. Both groups (HazCom and supervisor skills CBT) improved from pre- to post-workshop (t-test $p = 0.08$ and 0.10, respectively), but those increases were only from 46% to 51.4% and from 52% to 65.2%, respectively, on the post-workshop test. The consultant who conducted the workshop questioned whether the test questions were fully reflective of skill development in the workshop. Her notes indicated her conclusion that all participants grasped the conceptual difference between behavior and non-behavior, and that each participant identified a specific behavior they wanted to change and had developed an action plan for the behavior change by the end of the workshop, two key goals of the workshop.

Since research on training effectiveness has been heavily focused on well-educated office workers (Cohen and Colligan, 1998; Arthur et al., 2003), there has been almost no research to confirm that the principles emerging from that literature apply to blue-collar workers, and it is even less clear if those principles apply to Latino workers with limited formal education. Some (Brunette, 2005) have suggested developing separate, culturally sensitive training for Latino workers, but this can be an expensive proposition in an industry with a tight profit margin. Instead, the target workforce can serve as training consultants, as they did in this study, to participate in the design and content development of the training, since effectiveness rather than cost should be the key driver of safety training. The results of the present study suggest that widely accepted behavioral principles work readily in Latino workers educated in Mexico for 5 to 9 years.

All of the benefits of the training may not be reflected in the test scores. For example, Mills (2005) reported that learning computer skills was accompanied by increases in self-confidence with related tasks, a theme seen in prior CBT among Latino workers with limited education. Based on anecdotal comments during and at the end of the CBT, and especially after the face-to-face workshop, participants voiced a very high degree of enthusiasm about taking the training.

Conclusion

Computer-based training can be an effective method for teaching basic supervisory concepts to immigrant Latino workers, including those with formal education of 5 to 9 years. Since perceptions of immigrant Latino workers may drive training decisions, and there is evidence that those who perceive the immigrant Latino personality negatively tend to ignore training options that involve technology (Kolland, 1990), this study suggests that limited education is not a barrier to using technology for training.

Anecdotally, at least some companies who employ a predominantly immigrant Latino workforce increasingly seek to select members of that workforce to assume supervisory roles. Given the under-representation of Latinos in managerial positions and the high correlation between years of education and placement in managerial jobs (Mundra et al., 2003), the conclusion that industry-standard CBT and workshop training methods are effective in teaching supervisory skills to Latino supervisors with limited education, albeit in Spanish, is encouraging. This exploratory study suggests that traditional consultant workshops and technology such as CBT are methods that should be added to those recommended for training the future agricultural workforce (Lee et al., 2007).

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Conflict of Interest

Dr. Anger is the inventor of the cTRAlN system and 9BUTTON used in this study. This could result in financial benefit for him and OHSU if this study and others like it produce useful results. Dr. Anger also has a company, NwETA, that could benefit if this study and others like it produce useful results. This potential conflict has been reviewed and managed by OHSU and the Integrity Program Oversight Council. If you would like more information, you may contact the OHSU Research Integrity Office at 503-494-7887.

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