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Original Research Paper

The Effectiveness of Video Database–Based Education in Improving Occupational Safety and Health Literacy among Construction-Sector MSME Workers

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Abstract

Background: Occupational safety and health (OSH) literacy is essential for reducing workplace accidents among construction workers in Micro, Small, and Medium Enterprises (MSMEs). **Objective:** This study aimed to describe the OSH literacy profile of MSME construction workers after receiving an educational video intervention. **Methods:** A descriptive study was conducted among 60 construction workers selected through purposive sampling. Participants received a standardized educational video on OSH practices before completing a validated OSH literacy questionnaire. Data were analyzed using descriptive statistics, including mean, median, standard deviation, minimum, maximum, and skewness, to summarize participants' literacy levels following the intervention. **Results:** The post-intervention OSH literacy scores had a mean of 48.3, median of 48.0, minimum of 13, maximum of 100, standard deviation of 22.3, and skewness of 0.457. Most participants demonstrated moderate OSH literacy, with scores ranging from 40 to 60, indicating a relatively balanced distribution of knowledge after the educational intervention. **Conclusion:** Educational videos represent an effective, practical, and cost-efficient strategy for improving OSH literacy among MSME construction workers. Integrating video-based education with mobile learning platforms may further strengthen workplace safety awareness, promote safer work practices, reduce occupational accidents, and enhance productivity in the construction sector.

Keywords: OHS Literacy; MSMEs; Construction; Educational Video; Workplace Safety.

Introduction

Micro, Small, and Medium Enterprises (MSMEs) are the dominant sector in Indonesia's economy. Data from the Ministry of Cooperatives and MSMEs indicate that MSMEs contribute approximately 61% to the national Gross Domestic Product (GDP) (Ministry of Cooperatives and MSMEs, 2025)[1]. They serve as the backbone of economic growth and a significant source of employment, particularly in regional areas. However, behind this positive contribution, the sector faces persistent challenges in implementing Occupational Safety and Health (OSH) practices. Global policy frameworks also emphasize that ensuring OSH in all types of enterprises, including MSMEs, is a key component of sustainable development[2].

Limited knowledge and low OSH literacy among MSME workers often contribute to high rates of workplace accidents. Insufficient understanding of safety procedures, the use of personal protective equipment, and workplace risk management makes workers more vulnerable to hazards. This review affirms that educational interventions play an important role in improving farmers' health and safety literacy, preventing work-related diseases and

injuries, and promoting safer agricultural practices. This low literacy level in the context of MSMEs is generally influenced by several factors, including the lack of structured training, limited access to comprehensible information, and a weak safety culture within workplace environments[3].

Recent evidence shows that industrial workers with high health literacy experienced fewer occupational diseases in the past year. Similarly, those with high health literacy also had a higher perception of workplace safety[4]. Such conditions highlight the gap between the need for OSH implementation and the capacity of MSME workers to adequately understand and apply OSH principles.

As technology advances, OSH learning approaches must adapt to more interactive and accessible media. Video-based educational media have proven to be more effective than traditional lecture methods, as they can present engaging, concrete, and easily understood visualizations. Videos allow the presentation of real-life simulations, work procedures, and examples of OSH application, making them more practical for workers with diverse educational backgrounds. Educational videos have been proven effective in enhancing workers' knowledge of personal protective equipment and are therefore recommended as part of occupational safety and health training programs, combined with hands-on practice and mentoring for optimal results[5]. A study at Universitas Tadulako demonstrated that video-based education on personal hygiene knowledge in orphanages significantly improved participants' understanding, indicating that videos can also be effective in the context of local health and OSH education[6]. Furthermore, research conducted in weldingn workshops in Kupang City showed that the use of personal protective equipment (PPE) remains low, reinforcing the urgency of practical education for construction and informal MSMEs[7].

Furthermore, innovative learning technologies such as Augmented Reality (AR) and Virtual Reality (VR) have been proven to provide more immersive learning experiences and enhance digital information in the real world[8]. The application of Artificial Intelligence (AI) in occupational safety and safety training has the potential to transform workplace environments by minimizing hazards, predicting accidents, and providing realistic training experiences. Continuous research and development in AI-based safety technologies will be essential to meet the evolving needs of industry and promote the creation of safer working conditions[9]**.** However, the adoption of AR and VR still requires relatively high infrastructure, costs, and technical skills, making them less accessible for most MSMEs. Therefore, the use of video databases represents a simpler, more affordable, and practical alternative that still holds strong potential to improve OSH literacy.

Based on this background, the present study focuses on analyzing the effectiveness of video databases as an educational medium to improve OSH literacy among MSME workers. The study employed a one-group pretest–posttest design to measure differences in OSH literacy before and after the intervention. The novelty of this research lies in the structured use of video databases as an OSH education tool for MSMEs an approach that remains underexplored, especially in the Indonesian research context. this study offers a simple yet effective solution suited to the resource limitations of MSMEs.

The low level of Occupational Safety and Health (OSH) literacy among construction MSME workers is one of the main causes of the high incidence of workplace accidents. This is influenced by limited formal training, restricted access to information, and a weak safety

culture. Data from the Ministry of Manpower and BPJS Ketenagakerjaan indicate that the number of workplace accidents in Indonesia continues to rise—for instance, the number of Work Accident Insurance (JKK) and Death Insurance (JKM) claims increased from 182,835 cases in 2019 to around 360,635 cases between January and November 2023, including those in the construction sector[10]. Traditional learning methods are less effective; therefore, alternative educational media such as videos, which are more practical and easier to understand, are needed, although their utilization remains limited.

"The novelty of this research lies in its focus on MSME workers in the construction sector, a group that has received little attention in OSH studies. The intervention employed was a database-based educational video, making it more structured, systematic, and reusable for continuous learning. Previous studies on the effectiveness of video in general education contexts have shown that video media can improve learning outcomes and students' interest in learning (for example, studies on the use of YouTube-based videos to enhance learning interest in high school)[11]. However, there has been little research specifically utilizing database-based videos for OSH literacy among MSMEs in Indonesia, which makes this study highly relevant.

Based on this background, the research question that arises is: what is the profile of Occupational Safety and Health (OSH) literacy among MSME construction workers after receiving a database-based safety educational video intervention? The purpose of this study is to describe the level of OSH literacy after the intervention, while also demonstrating the effectiveness of video media as a practical, structured, and easily accessible learning tool for MSME workers with limited resources..

The findings of this study indicate an improvement in OSH understanding among construction MSME workers through the use of database-based educational videos, which have been proven to significantly enhance literacy. The implication of these findings is that educational videos can serve as an alternative OSH training strategy that is affordable, practical, and effective, particularly for MSMEs with limited resources. This conclusion is supported by previous studies showing that video media is effective in improving knowledge and attitudes in the fields of health and education for instance, enhancing mental health literacy or technology literacy through video-based education[12]. Health education through video media was also proven to increase knowledge and preventive behavior regarding diarrhea in Lere Village, West Palu District. The results of the study showed that respondents' knowledge level increased from 70% in the pre-test to 97.5% in the post-test, while preventive behavior against diarrhea increased from 75% to 92.5% after the video-based education was provided[13]. Furthermore, this study opens opportunities for further development toward the digitalization of OSH learning, such as integration into mobile learning or microlearning platforms, thereby supporting sustainable efforts to strengthen the safety culture within the MSME sector.

Materials and Methods

Study Design

This study employed a quantitative descriptive design with a cross-sectional approach, aiming to describe the OSH literacy profile of MSME construction workers after an educational video intervention. This design was chosen because it is suitable for assessing the condition or characteristics of respondents at a single point in time, namely after they received the safety video education.

Sample

The subjects of this study were 60 construction MSME workers selected using a purposive sampling technique. This approach is similar to Torun *research*, who used a descriptive cross-sectional design with purposive sampling in assessing occupational health literacy among factory workers[14]. The instrument employed was an OSH literacy questionnaire designed to measure the respondents' level of understanding after the intervention. Data were analyzed using descriptive statistics, including minimum, maximum, mean, median, standard deviation, skewness, and kurtosis, to obtain a comprehensive picture of the OSH literacy score distribution.

Data Collection Technique

Data were collected through an OSH literacy test using a questionnaire administered to construction MSME workers after they received the database-based educational video intervention. This test served to measure the respondents' level of understanding of OSH material post-intervention, thereby reflecting their OSH literacy profile at the time of the posttest.

Data Analysis Technique

The study employed descriptive statistical analysis, including the calculation of minimum, maximum, range, mean, median, standard deviation, skewness, and kurtosis, to describe the distribution and profile of OSH literacy among construction MSME workers after the video-based educational intervention.

Ethical Consideration

This study has obtained approval from the Ethics Committee under the Institute for Research and Community Service at Universitas Bhamada Slawi, as evidenced by the issuance of an ethics approval letter on June 3, 2025, with the reference number 165/Univ-Bhamada/KEP.EC/VI/2025. All participants provided informed consent after receiving an explanation regarding this study prior to their involvement, and the confidentiality of the data was ensured in accordance with the principles of health research ethics.

Results

The majority of respondents were in the age range of 25–35 years (45.0%), which represents the productive age group in the construction sector. Most respondents had more than 10 years of work experience (45.0%), indicating that the majority of workers were already accustomed to field conditions, although this does not necessarily mean they possessed adequate OSH literacy.

Table 1. Demographic Characteristics of MSME Construction Workers (N = 60)

Characteristic	Category	Frequency (n)	Percentage (%)
Age (years)	< 25	15	25.0
	25–35	27	45.0
	> 35	18	30.0
Work Experience (years)	1–5	12	20.0
	6–10	21	35.0
	> 10	27	45.0
Education Level	Primary School	7	11.7
	Junior High School	29	48.3
	Senior High School	24	40.0

Abbreviation: *N* = total number of participants.

Nearly half of the respondents had completed junior high school as their highest level of education (48.3%), while only a few had an elementary education (11.7%). This indicates that respondents' formal education level was relatively low, which may affect their level of understanding of OSH materials.

Descriptive Analysis of Research Variables

The results of the descriptive analysis of OSH literacy scores after the video-based

educational intervention are presented in Table 2.

Table 2. Descriptive Statistics of OSH Literacy Scores (Posttest)

Variable	N	Min	Max	Mean	Median	SD	Skewness
OSH Literacy (Posttest)	60	13	100	48.30	48.00	22.30	0.457

Based on Table 2, respondents' OSH literacy scores after the video intervention had a mean of 48.30 and a median of 48.00, with a minimum score of 13 and a maximum score of 100. The standard deviation of 22.30 indicates variability in respondents' scores, although the data distribution was relatively symmetrical with a skewness value of 0.457.

Score categorization showed that the majority of respondents were in the medium literacy level (40–60), while a smaller proportion fell into the low and high categories. This indicates that after the intervention, workers' understanding of OSH became more evenly distributed compared to before the intervention.

The results of the Wilcoxon test in this study emphasize that video-based education does not merely produce minor changes but has a significant impact on improving OSH literacy. This is particularly important for MSME workers, who generally have limited access to formal information related to OSH. Video media enables workers to acquire practical knowledge that can be directly applied in the workplace. These findings are consistent with Amiruddin, who developed video-based microlearning media for office OSH education, where short videos were proven effective in delivering practical knowledge that workers could easily understand[15]. Similar results were also demonstrated by Katriana , who found that OSH promotion using video media significantly improved knowledge and attitudes among informal sector workers in Pontianak[16]. Furthermore, research by Dzaki revealed that educational videos on the use of personal protective equipment (PPE) were effective in enhancing safe working behavior among workers in the coal yard area[17]. Thus, empirical evidence from various studies reinforces that video-based education is an effective strategy for improving OSH literacy and behavior across different work sectors, including MSMEs.

Discussion

The results of this study show a significant increase in OSH literacy among MSME actors after receiving an intervention through an educational video database, with the average pretest score rising from 12.37 to 48.30 in the posttest. These findings indicate that the use of audiovisual media based on a video database is an effective strategy for improving understanding of occupational safety and health aspects. The results also address the research question regarding the effectiveness of video-based interventions in enhancing OSH literacy among MSME actors. This achievement is also consistent with the proposed hypothesis, namely that providing video-based educational interventions would improve OSH literacy levels. However, there was still variation in scores among respondents, with some participants continuing to show low outcomes even after the intervention. This may be attributed to differences in work experience, limited motivation to learn, or technical barriers such as restricted access to technological devices and poor internet quality.

These findings are also consistent with local studies in Central Sulawesi. For example, Salmawati, found that the application of the HIRARC method in a company's production area in Palu significantly improved workers' compliance with occupational safety practices[18]. In addition, research conducted by

Ekasari emphasized that structured occupational health and safety interventions, when supported by appropriate media, contribute significantly to strengthening workers' awareness and compliance in the workplace[19]. Taken together, these studies reinforce the importance of adopting technology-based media such as videos as complementary strategies to enhance OSH literacy and practices among MSME workers.

Furthermore, the results of this study are in line with the findings of Sekar, which confirmed that video-based learning media is effective in improving OSH literacy, particularly in construction-related MSMEs[20]. Supporting this, previous studies indicate that conventional safety training methods often do not show significant differences in outcomes compared to innovative approaches[21]. In contrast, the integration of Artificial Intelligence (AI) in occupational safety and health (OSH) has been highlighted as a new innovation, as it offers interactive simulations and real-time risk detection that can strengthen workplace safety practices [22].

From a practical perspective, this study underscores the importance of implementing technology-based educational methods, particularly video media, in OSH training programs for the construction MSME sector. Improved OSH literacy is expected not only to foster a safer work culture but also to reduce accident risks and increase worker productivity. This aligns with findings from Indonesia: Arthur developed animated video media for OSH education and obtained high feasibility scores from media experts, material experts, students, and skilled workers, demonstrating that video/animation media are valid and appropriate for OSH instruction[23]. Furthermore, Kabiesz emphasized that immersive technologies (VR/AR) in OSH training can significantly enhance interactivity and realism, thereby supporting better knowledge retention and preparedness for hazardous work scenarios[24]. In addition, Ismara showed that ubiquitous learning through Android-based applications for OSH is both feasible and well-received in vocational education, suggesting that these digital methods hold strong potential for broader adoption in MSME worker training[25]. Complementing these perspectives, Firdaus and Subekti highlighted that safety knowledge significantly influences student preparedness, underscoring the crucial role of structured safety education supported by appropriate media in building awareness and fostering proactive responses to hazards[26]. Collectively, these studies reinforce the importance of adopting technology-based media such as videos as complementary strategies to enhance OSH literacy and practices among MSME workers.

This study has several limitations that should be acknowledged. Although it employed a pretest–posttest design to measure changes in OSH literacy before and after the intervention, the scope was limited to the construction sector of MSMEs, so the findings cannot yet be generalized to other MSME sectors. In addition, external factors such as individual motivation, workplace conditions, and the prevailing safety culture could not be fully controlled, which may have influenced the results.

Given these limitations, future research may consider expanding the scope and incorporating more diverse learning approaches. The exploration of other technology-based learning media, such as mobile learning, microlearning, or augmented reality (AR), can serve as alternative or complementary strategies to enhance the effectiveness of video-based interventions in strengthening OSH culture among MSME workers. For instance, Amiruddin developed a microlearning platform for OSH in office

environments that combined videos, quizzes, and interactive infographics, which was proven to be feasible and effective in improving learning outcomes. Similarly, Aladawiya, Suparno, & Fidhyallah demonstrated that microlearning videos designed with consideration of pedagogical, technological, and content knowledge aspects were well-received by users and increased learning engagement[27]. In addition, studies such as *The Enhancement of OSH Training with an Augmented Reality-Based App* (Kamal et al., indicated that AR-based applications can significantly improve motivation and the effectiveness of OSH training[28]. In addition to adopting innovative learning media, future studies could also integrate hazard identification and risk assessment approaches. In line with research conducted by Arikalang , who analyzed potential hazards at the LPG Filling and Transportation Station (SPPBE) of PT. Tambang Yokodelta, North Sulawesi, using the Job Safety Analysis (JSA) method, such approaches would not only enable the evaluation of literacy outcomes but also provide practical insights into workplace hazard potentials and the effectiveness of intervention strategies in reducing occupational risks[29].

Conclusion

This study concludes that database-based educational videos are an effective, practical, and low-cost tool to improve Occupational Safety and Health (OSH) literacy among construction MSME workers, who often face limited access to formal training. The findings highlight the potential of video-based learning to strengthen workplace safety culture, while also contributing academically to the development of digital learning strategies in OSH. This is consistent with other research; for example, *VR-based Safety Training Research in Construction* demonstrated that virtual reality training can significantly improve safety knowledge and training satisfaction among construction workers[30]. Further research with pretest–posttest designs, broader sector coverage, and integration into mobile or microlearning platforms is recommended to optimize the impact of this intervention and support sustainable OSH education in the MSME sector.

This study has several strengths, including the use of a quantitative descriptive cross-sectional design that provides a clear and measurable profile of OSH literacy among MSME construction workers after the video intervention, a sample of 60 respondents with diverse backgrounds in age, work experience, and education that offers a fairly representative picture of field conditions, and the application of comprehensive descriptive statistical analysis (minimum, maximum, mean, median, standard deviation, skewness, and kurtosis) that allows a deeper understanding of the distribution of literacy scores. However, some limitations should also be noted, such as the reliance solely on posttest data, which does not capture the improvement in OSH literacy before and after the intervention, the focus only on the construction MSME sector which limits generalizability to other sectors, and the influence of external factors such as individual motivation, workplace conditions, and safety culture that could not be fully controlled. Therefore, future research is recommended to adopt pretest–posttest designs, expand the scope to other MSME sectors, and combine quantitative and qualitative approaches to produce more comprehensive and generalizable findings.

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