Assyfa Journal of Multidisciplinary Education

AJME. Vol. 3 No. 21 (2025) 108-125

e-ISSN: 3047-3942 p-ISSN: 3047-3942



Check for updates

OPEN ACCESS

DOI: 10.61650/ajme.v3i1.1422

ORIGINAL RESEARCH ARTICLE

The Effect of TikTok Audiovisual Media on Occupational Health and Safety on Understanding of Work Accident Hazards in Automotive Workshops

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Article History: Received: 12 Jul 2025 • Revised: 25 Aug 2025 • Accepted: 25 Sep 2025 • Published: 30 Sep 2025

ABSTRACT

This study aimed to describe changes in the understanding of Automotive Engineering Education students at Universitas Negeri Malang regarding work accident hazards and occupational health and safety (OHS) principles after learning with TikTok audiovisual media. The study used a quantitative approach with a one-group pre-test–post-test pre-experimental design. The source reports 25 students from the 2021 cohort as participants. Data were collected through multiple-choice tests before and after the intervention. The pre-test and post-test used the same 15 multiple-choice items; the source states that the maximum score for both was 90. The reported analyses included descriptive statistics, normality tests, a linearity test, and simple linear regression. The mean score increased from 32.88 (SD = 22.921; range 0–72) to 73.44 (SD = 17.108; range 22–90), a descriptive difference of 40.56 points. Cronbach's alpha was reported as 0.859 for the pre-test and 0.871 for the post-test. However, the available inferential output tests the relationship between pre-test and post-test scores, not directly the paired difference attributable to the intervention. Therefore, the increase in the mean indicates a descriptive change, but causal claims and the significance of the change require an appropriate paired analysis. The findings suggest that short videos can serve as supporting media for OHS learning, with a need for further evaluation using equivalent instruments and appropriate analyses.

Keywords: TikTok; audiovisual; occupational health and safety; OHS; student understanding; automotive workshop

ABSTRAK

Penelitian ini bertujuan mendeskripsikan perubahan pemahaman mahasiswa Pendidikan Teknik Otomotif Universitas Negeri Malang mengenai bahaya kecelakaan kerja dan prinsip keselamatan dan kesehatan kerja (K3) setelah pembelajaran menggunakan media audiovisual TikTok. Penelitian menggunakan pendekatan kuantitatif dengan desain pre-eksperimental satu kelompok pre-test–post-test. Sumber melaporkan 25 mahasiswa angkatan 2021 sebagai peserta. Data dikumpulkan melalui tes pilihan ganda sebelum dan sesudah intervensi. Pre-test dan post-test menggunakan 15 butir pilihan ganda yang sama; sumber menyatakan skor maksimum keduanya 90. Analisis yang dilaporkan meliputi statistik deskriptif, uji normalitas, uji linearitas, dan regresi linear sederhana. Rerata skor meningkat dari 32,88 (SD = 22,921; rentang 0–72) menjadi 73,44 (SD = 17,108; rentang 22–90), dengan selisih deskriptif 40,56 poin. Cronbach's alpha dilaporkan sebesar 0,859 untuk pre-test dan 0,871 untuk post-test. Namun, keluaran inferensial yang tersedia menguji hubungan skor pre-test dengan post-test, bukan secara langsung perbedaan berpasangan akibat intervensi. Karena itu, peningkatan rerata menunjukkan perubahan deskriptif, tetapi klaim kausal dan signifikansi perubahan memerlukan analisis berpasangan yang tepat. Temuan memberi indikasi bahwa video pendek dapat menjadi media pendukung pembelajaran K3, dengan kebutuhan evaluasi lanjutan menggunakan instrumen yang setara dan analisis yang sesuai.

Kata Kunci: TikTok; audiovisual; keselamatan dan kesehatan kerja; K3; pemahaman mahasiswa; bengkel otomotif

How to cite: Handoko, R. S., Reefabrilliant, R., Sari, R. U. A., Anggara, R., Ardiansyah, A. B., Sandi, A. K., … Putra, A. D. P. G. (2026). The Effect of TikTok Audiovisual Media on Occupational Health and Safety on Understanding of Work Accident Hazards in Automotive Workshops. *Assyfa Journal of Multidisciplinary Education, 3*(1). Retrieved from https://journal.assyfa.com/index.php/ajme/article/view/1422

1. INTRODUCTION

Occupational health and safety (OHS) is a fundamental element of engineering education and of carrying out work that involves equipment, machinery, energy, chemicals, and practical activities. In automotive workshops, risks can arise from improper use of tools, moving components, surfaces made slippery by oil, electrical work, battery charging, air-conditioning systems, and the neglect of work procedures. Therefore, OHS instruction cannot merely introduce definitions and regulations; it needs to build the ability to recognize hazards, select preventive actions, use personal protective equipment, and follow emergency procedures.

The national regulatory framework positions occupational safety as an important responsibility in the work environment. Law Number 1 of 1970 on Occupational Safety is one of the legal bases for safety protection in the workplace, while Government Regulation Number 50 of 2012 regulates the implementation of the Occupational Health and Safety Management System. In vocational education, these principles are relevant because laboratories and workshops are learning environments that partly replicate industrial working conditions. Habituation to safe procedures during education is expected to help students understand that safety is not an add-on to practical activities but part of professional competence.

The source document describes risky incidents in the automotive workshop, including dropped tools, slipping on oil, being pinched, being scratched, and reported incidents related to battery charging and vehicle air-conditioning practice. This information comes from interviews with the laboratory manager recorded in the source. Because it is not accompanied by verified incident records that can be analyzed, this information is treated as initial context, not as an estimate of accident frequency or statistical evidence of risk levels.

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Understanding OHS has a dual importance for students who are prospective automotive educators. Students need to protect themselves during practical work and, in the future, be able to model safe behavior when teaching or supervising learners in the workshop. Gaps in understanding may affect the ability to identify hazards, assess risks, use personal protective equipment, understand laboratory rules, and respond to emergencies. Therefore, learning media that help students recognize hazardous situations concretely deserve consideration as a complement to demonstrations and direct explanation.

The development of digital media offers options for delivering material through short videos. TikTok allows the presentation of a combination of moving images, sound, text, and brief demonstrations that can show examples of both safe and unsafe behavior. Aji (2018) discussed the use of TikTok as a medium for learning Indonesian language and literature, while Buana and Maharani (2020) examined the use of the TikTok application and children's creativity. This literature shows that short-video platforms have been discussed in educational contexts, but their benefits need to be assessed according to the material, participant characteristics, activity design, and the learning outcomes measured.

The use of TikTok for OHS learning has both opportunities and limitations. The audiovisual format can help display procedural sequences, examples of the use of personal protective equipment, and the consequences of unsafe actions. Visualization can attract attention and help connect abstract concepts with workshop situations. However, short videos do not automatically guarantee deep understanding. Message quality, procedural accuracy, duration, opportunities for discussion, and links to practical experience remain important. Social media also carries the potential for distraction, so its use needs to be directed by learning objectives and clear evaluation activities.

Previous studies listed in the source show links between OHS education, workshop conditions, and the use of audiovisual media. Harvana (2021) examined the OHS knowledge of Automotive Engineering Education students regarding accident hazards in a welding workshop. Hidayat and Wahyuni (2016) discussed occupational health and safety in workshops within an engineering education setting. These studies are relevant for emphasizing the importance of understanding risks and controlling hazards in practice spaces. Research on audiovisual media provides a basis for examining how the presentation of material can support learning, although results from different contexts cannot be directly generalized to automotive OHS material.

The problem examined in this study is the level of student understanding before and after using TikTok audiovisual media on OHS, and the change in scores recorded after the intervention. The study focuses on students of the 2021 cohort of the Bachelor's Program in Automotive Engineering Education at Universitas Negeri Malang. Its main objective is to describe the pre-test and post-test scores and to examine the results of the statistical analyses reported in the source. With a one-group design, this study provides an initial picture of changes in the observed group, but it does not provide a control group to separate the effect of the intervention from other factors such as additional learning experiences or test repetition effects.

The expected contribution is to provide initial information for the development of audiovisual-based OHS learning in automotive vocational education. The findings may serve as a consideration for designing contextual supporting media, not as sole evidence that TikTok is superior to other methods. This article also treats the suitability of instruments and statistical analyses as an important part of interpretation, because a comparison of pre-test and post-test scores can only be

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interpreted strongly if the scores compared have an equivalent measurement basis and are tested with appropriate procedures.

2. RESEARCH METHODS

The study used a quantitative approach with a one-group pre-test–post-test pre-experimental design. Participants underwent an initial measurement, received the learning intervention, and then underwent a final measurement. There was no control group, and the source does not report randomization of participants. This design can describe changes in scores in the observed group but is limited in its ability to conclude that the change was caused solely by TikTok media.

The participants mentioned in the source were 25 students of the 2021 cohort of the Bachelor's Program in Automotive Engineering Education, Universitas Negeri Malang. The research was conducted at Universitas Negeri Malang. The source mentions a plan to carry out the study at the beginning of the even semester, or in February, but does not consistently provide actual dates. Therefore, the timing of the study is not specified further. Participant selection was linked to students in that cohort who were taking the OHS course and who were considered to be approaching the transition to industry.

The intervention consisted of presenting TikTok audiovisual content on OHS and potential work accident hazards in automotive workshops. The material in the instrument blueprint covered the definition and objectives of OHS, hazard identification, risk control, personal protective equipment, workshop safety regulations, emergency actions, accident reporting, and hazardous and toxic materials. The source does not specify in detail the number of videos, the duration of each video, content links, the learning scenario, or the length of exposure. This information is not added because it is not available in the source.

Data were collected through multiple-choice tests before and after the intervention. According to the author's clarification, the pre-test and post-test used the same 15 multiple-choice items. Thus, both measurements used the same number and content of items. The source reports a maximum score of 90 for each test; the technical details of scoring must still follow the original instrument and scoring guidelines.

The procedure comprised preparation, implementation, and analysis. The preparation stage included determining the research focus, collecting contextual information from the laboratory manager, developing the instrument, and determining the design. In the implementation stage, participants took the pre-test, received instruction through TikTok content on OHS, and then took the post-test. In the analysis stage, the source states that IBM SPSS version 30 was used for descriptive statistics, normality tests, linearity tests, and regression analysis/t-tests as reported in the document.

Instrument validity was described by comparing item correlations with an r-table value of 0.3365. The source states that the pre-test and post-test items met the validity criteria, but the complete output table showing the value of each item is not presented in full in the main section. Therefore, this article reports the validity results as stated by the source author, without claiming to have recalculated them. Internal reliability was measured using Cronbach's alpha; the reported values were 0.859 for the pre-test and 0.871 for the post-test.

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Data analysis separated descriptive statistics from the testing of paired change. Descriptive statistics included the mean, minimum and maximum scores, and standard deviation. The mean difference was calculated as $\bar{\Delta} = \bar{X}_post - \bar{X}_pre$. To test whether the change within the same participants differs from zero, the appropriate primary procedure is a paired t-test on the difference scores $D_i = X_post,i - X_pre,i$, provided that the distribution of the difference scores meets the relevant assumptions. If parametric assumptions are not adequate, the Wilcoxon signed-rank test may be considered. The normality relevant to the paired t-test is the normality of the difference scores, not merely the normality of the pre-test and post-test separately. Individual data and paired test output are not available in a form that can be recalculated; therefore, t, p, confidence intervals, and paired effect sizes were not calculated or reconstructed.

The following formulas for paired change analysis are presented as images so that the mathematical notation remains legible. D is the score difference for each participant (post-test minus pre-test), n is the number of score pairs, and s_D is the standard deviation of the differences. These formulas describe the procedure that should be used if individual data were available; they do not imply that the tests were computed in this study.

$$\overline{D} = \overline{X}_{post} - \overline{X}_{pre}$$

Mean difference

$$t = \frac{\overline{D}}{s_D/\sqrt{n}}$$

Paired t-test

$$s_D = \sqrt{\frac{\sum_{i=1}^{n}(D_i - \overline{D})^2}{n-1}}$$

Standard deviation of difference scores

$$d_z = \frac{\overline{D}}{s_D}$$

Effect size for paired data

$$\overline{D} \pm t_{(1-\alpha/2,\, n-1)}\frac{s_D}{\sqrt{n}}$$

Confidence interval for the mean difference

The descriptive mean difference was calculated from the available summary: $\bar{\Delta} = 73.44 - 32.88 = 40.56$ points. Because the reported maximum score for both measurements is 90 and both tests used the same 15 items, an aggregate normalized gain based on group means can be calculated as $g_aggregate = (\bar{X}_post - \bar{X}_pre)/(X_max - \bar{X}_pre) = (73.44 - 32.88)/(90 - 32.88) = 0.710$. This value is a descriptive calculation on group means, not a mean of individual gains, not a significance test, and not a paired effect size. Individual data are still required to calculate the standard deviation of the difference scores, the paired t-test or its alternative, confidence intervals, and appropriate effect sizes. This manuscript does not create synthetic data.

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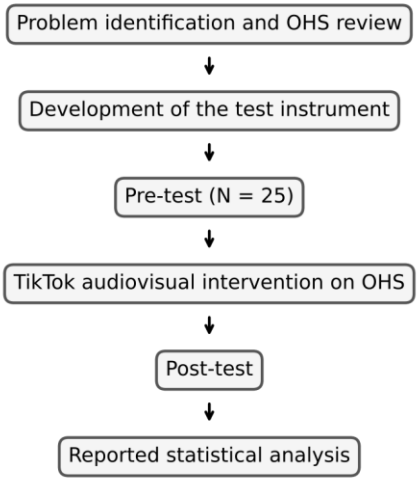


Figure 1. Research flow.

3. RESULTS AND FINDINGS

The following results are based on the summary statistics and analysis output listed in the source document. Individual data were not reconstructed because complete raw data are not available as a recalculable table in the main manuscript.

Table 1. Descriptive statistics reported in the source.

Statistic	Pre-test	Post-test
Number of participants	25	25
Number of test items	15	15
Mean score	32.88	73.44
Minimum score	0	22
Maximum score	72	90
Standard deviation	22.921	17.108
Cronbach's alpha	0.859	0.871

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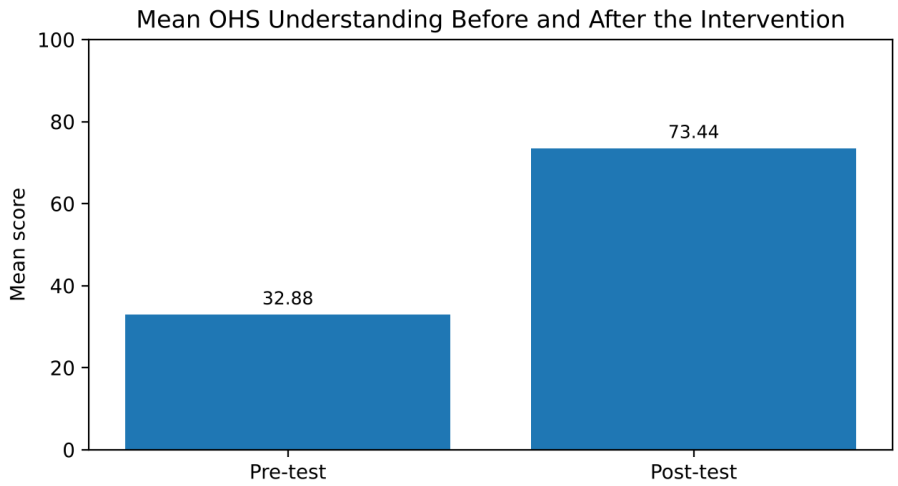


Figure 2. Comparison of mean pre-test and post-test scores based on the summary statistics in the source.

The mean pre-test score was 32.88, with a minimum score of 0, a maximum score of 72, and a standard deviation of 22.921. After the intervention, the reported mean post-test score increased to 73.44, with a minimum score of 22, a maximum score of 90, and a standard deviation of 17.108. The mean difference of 40.56 points indicates a large descriptive change on the reported score scale. The lower standard deviation in the post-test indicates that final scores were less dispersed than initial scores. However, without individual data, complete evidence of test equivalence, and appropriate paired testing, this information is not sufficient to establish the statistical significance of the change.

An additional calculation at the level of group means used the aggregate normalized gain. The formula and numerical substitution are shown in Figure 3.

$$g_{aggregate} = \frac{\bar{X}_{post} - \bar{X}_{pre}}{X_{max} - \bar{X}_{pre}}$$

$$= \frac{73.44 - 32.88}{90 - 32.88} = \frac{40.56}{57.12} = 0.710$$

Figure 3. Calculation of the aggregate normalized gain based on group means.

The result g_aggregate = 0.710 describes the increase in the mean relative to the available room for improvement from the initial mean to the maximum score of 90. Because the calculation is based on group means, this value should not be called a mean individual N-gain or evidence of statistical significance. Testing the change still requires paired scores for each participant.

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Table 2. Summary of descriptive statistics for pre-test and post-test scores.

Statistic	Pre-test	Post-test
Number of participants	25	25
Mean score	32.88	73.44
Standard deviation	22.921	17.108
Mean difference	—	+40.56 points

The pre-test instrument was reported to have a Cronbach's alpha of 0.859 and the post-test 0.871. Both values are above the commonly used threshold of 0.70 as an initial benchmark for internal consistency. However, high reliability does not by itself prove construct validity or the equivalence of the two instruments. Because the pre-test and post-test used the same 15 items, both have an equivalent item basis. Score interpretation must still take into account the consistency of the scoring procedure.

Table 3. Results of the assumption tests and regression reported in the source.

Test	Reported statistics	Interpretation
Pre-test normality	Kolmogorov–Smirnov p = 0.101; Shapiro–Wilk p = 0.081	Both > 0.05; the source concludes there is no significant departure from normality.
Post-test normality	Kolmogorov–Smirnov p = 0.116; Shapiro–Wilk p = 0.068	Both > 0.05; the source concludes there is no significant departure from normality.
Linearity	Linearity p = 0.098; Deviation from Linearity p = 0.924	No significant deviation from linearity was found; the linear component is also not significant at 0.05.
Simple regression	R = 0.404; R^2 = 0.164; B = −0.676; t = −2.121; p = 0.045	The model relates pre-test scores to post-test scores; it is not a direct test of the paired difference.

The source reports significance values for the normality tests above 0.05 for the pre-test and post-test scores separately. These results cannot replace an examination of the normality of the distribution of difference scores, which is required for the paired t-test. Because individual difference scores are not available, the normality assumption for testing change cannot yet be verified.

For the linearity test, the significance value for Linearity was recorded as 0.098 and for Deviation from Linearity as 0.924. A Deviation from Linearity value above 0.05 indicates no evidence of a significant departure from a linear pattern based on the reported table. However, the Linearity value of 0.098 also does not indicate a significant linear component at the 0.05 level. This result cannot be used as direct evidence of the effectiveness of the intervention.

The simple regression analysis reported R = 0.404 and R^2 = 0.164. Thus, the model explains 16.4% of the variance in the dependent variable entered into the model, according to the specification of the source output. The B coefficient for the pre-test was −0.676, with t = −2.121 and p = 0.045. The negative coefficient describes a negative statistical relationship between pre-test and post-test scores in the reported model. This coefficient does not indicate that TikTok causally increased or decreased scores.

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Table 4. Regression results reported in the source and the limits of their interpretation.

Component	Value	Interpretation
R	0.404	Correlation/model according to the source output
R^2	0.164	The model explains 16.4% of the variance in post-test scores under that specification
Pre-test B coefficient	−0.676	Negative relationship between pre-test and post-test scores in the reported model
t of regression coefficient	−2.121	Test of the regression coefficient, not a test of paired change
p of regression coefficient	0.045	Should not be interpreted as evidence of a significant pre–post change

4. DISCUSSION

4.1 Meaning of the Main Findings in the Context of OHS Learning

The main finding of this study is the difference in mean OHS understanding scores before and after learning assisted by TikTok videos. The mean increased from 32.88 to 73.44, a descriptive difference of 40.56 points. Based on the reported maximum score of 90, the aggregate normalized gain based on group means is 0.710. Descriptively, this figure indicates that the increase in the mean covers approximately 71.0% of the available room for improvement between the initial mean and the maximum score. This interpretation applies only to the group mean and does not replace paired data analysis. The finding is relevant to vocational education because understanding safety is a prerequisite for practical activities involving tools, moving components, electrical systems, chemicals, and potentially hazardous work environments. However, a one-group design without a control cannot separate the contribution of the media from other possible influences, such as exposure to the material, learning experience, or test repetition effects.

In automotive learning, OHS knowledge does not merely mean remembering definitions or regulations. Students need to recognize sources of hazards, anticipate consequences, select control actions, use personal protective equipment correctly, and know the appropriate response when an emergency occurs. Harvana (2021), in a study of Automotive Engineering Education students in the context of a welding workshop, showed that OHS understanding can be seen across several domains, including discipline, care, environmental conditions, use and maintenance of equipment, and health checks. That study reinforces the relevance of OHS as a multidimensional competency, but it cannot be used to conclude that the participants of this study have mastered all of these domains, because the outcome reported here is a knowledge test score.

The workshop context also requires a safety management system that goes beyond individual mastery. Hidayat and Wahyuni (2016) found that OHS planning, implementation, and evaluation in educational workshops need to be organized systematically and involve the parties related to practical activities. Thus, learning through video should be positioned as part of the OHS ecosystem in the study program, not as a stand-alone intervention. Digital materials can help students prepare before practical work, while the application of procedures, equipment inspection, supervision, and post-practice reflection still require consistent workshop governance.

The most appropriate interpretation of the results of this study is that there is an initial signal worth following up: the reported final scores were higher, but the mechanism and magnitude of change attributable specifically to the media have not been adequately identified. This formulation

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preserves the practical value of the study without overstating the evidence. The difference in scores provides a reason to develop a stronger evaluation, not a basis for claiming that TikTok has been proven more effective than direct demonstration, videos on other platforms, or regular instruction.

4.2 Pedagogical Explanation and Links with the Audiovisual Media Literature

Pedagogically, video can present information through visual and verbal channels simultaneously. The cognitive theory of multimedia learning explains that meaningful learning is more likely to occur when words and visual representations are designed in accordance with human information-processing capacity, rather than merely being displayed together (Mayer, 2024). In the OHS context, images or videos can show work sequences, body positions, the use of tools, environmental conditions, and the points at which risky actions occur. Such representations have the potential to help students connect the concept of hazards with situations that are more concrete than verbal descriptions alone. Nevertheless, multimedia theory does not state that all videos are automatically effective; content selection, focus of attention, clarity of the message, and participants' cognitive activity still determine the quality of learning.

The distinction between platform and instructional design also helps explain why the success of media cannot be determined solely by the number of views, video duration, or the perception that the material is engaging. In OHS learning, success needs to be linked to the accuracy of hazard identification, the reasoning behind the choice of controls, and the ability to apply procedures consistently. Videos that are engaging but do not direct attention to the relevant safety aspects risk producing superficial engagement. Conversely, short videos accompanied by diagnostic questions, feedback, and application exercises can function as part of a more complete instructional strategy. This implication is consistent with the multimedia learning principle that visual and verbal representations need to be designed to support active processing, not merely to add stimulation (Mayer, 2024).

TikTok is one channel for distributing short videos, but its learning value is not automatically inherent in the platform's name. Caldeiro-Pedreira and Yot-Domínguez (2023), through a systematic review of the use of TikTok in education, identified opportunities for using the platform to support engagement and learning while emphasizing the need for responsible use. A more recent review in the context of higher education also mapped the use of TikTok across disciplines and noted potential benefits for motivation, participation, and learning outcomes, while highlighting challenges of self-regulation and distraction from non-academic content (Yang et al., 2026). This literature supports the relevance of testing short videos as learning media, but it does not prove their effectiveness specifically for understanding automotive OHS.

The need for field-specific evaluation is also important because the consequences of misunderstanding OHS differ from those of errors in some other academic fields. In safety material, inaccuracy not only has the potential to lower test results but can also form habits that are risky if applied in the workshop. Therefore, content validation needs to cover technical accuracy, conformity with local procedures, and the possibility of misinterpretation. This approach links the digital media literature with the tradition of OHS management: media innovation is valuable when it strengthens, rather than replaces, the safety system designed for the practice environment (Hidayat & Wahyuni, 2016).

The findings of this study also need to be read in light of the difference between the attractiveness of media and instructional effectiveness. The short-video format may feel close to students' media habits, but this familiarity only explains the likelihood of access and acceptance, not directly the

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quality of learning. In their systematic review, Caldeiro-Pedreira and Yot-Domínguez (2023) emphasized that the use of TikTok in education needs to be supported by didactic objectives and media-use literacy. Yang et al. (2026) also identified that learning outcomes with TikTok are influenced by disciplinary context, implementation design, user characteristics, and the risk of distraction. Therefore, the results of this study should not be understood as a test of the platform in general, but rather as an initial evaluation of an audiovisual intervention delivered through a particular platform.

The studies by Aji (2018) and Buana and Maharani (2020) listed in the source also discuss the use of TikTok in educational or creativity contexts. However, the subject contexts and outcome indicators in those studies differ from OHS knowledge. Therefore, cross-context findings are more appropriately used as a conceptual background on the opportunities of social media for learning activities, not as a direct comparison with the results of this study. The more specific contribution of this study is the application of short-video media to automotive workshop safety material, with initial results in the form of a summary of scores before and after the intervention.

For short videos to become a purposeful learning resource, content should be designed around one or more explicit learning objectives. Each video can depict a work situation, ask students to identify hazards, explain the risks that may occur, and link preventive actions to the applicable operating procedures. The short duration can help limit the video to a single focus, but it should not eliminate important explanations or incorrectly simplify safety procedures. Videos showing unsafe actions, for example, must be accompanied by clear context so that students do not imitate such behavior without understanding its risks.

In the context of safety material, visual design must prioritize clarity and accuracy. For example, a video on lifting a vehicle needs to show the correct lifting points, equipment checks, securing the vehicle, and the areas to be avoided. If a video is so short that critical steps are skipped, students may form an incomplete picture of the procedure. Therefore, content selection needs to involve instructors or practitioners who understand workshop procedures and the applicable safety standards. If a video contains scenes of accidents or unsafe actions, these scenes should be framed as case studies, accompanied by an explanation of the causes and preventive steps. This is important so that the media do not merely dramatize risk but direct participants toward safety reasoning.

The sequence of learning activities is also important. Before watching, the instructor can convey the objectives and activate prior knowledge; while watching, students are directed to note hazards or decision points; after watching, students discuss the reasons for the chosen actions and compare them with workshop procedures. These activities ensure that students do not merely receive the content but process the information and connect it with their existing knowledge. For automotive education, relevant follow-up activities include hazard identification simulations, case analysis, demonstrations of the use of personal protective equipment, or observation of practice using clear rubrics. These steps are suggested pedagogical implications, not procedures that can be confirmed to have been applied in this study, because the details of the intervention are incomplete in the source.

The use of audiovisual media should also be combined with reflective practice. After watching, students can be asked to explain what hazards they saw, who could be affected, what the level of risk is, and what controls should have been applied. Such questions encourage students to move from recognizing objects to developing situational judgment. The instructor can then link the

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answers to operating procedures, workspace arrangement, equipment inspection, and the habit of reporting unsafe conditions. At the practice stage, observation using rubrics can help test whether the knowledge gained from the videos is applied in action. However, because the research source does not provide details of post-viewing activities, this description is a recommendation for instructional development and not a claim about the treatment that was carried out.

The use of TikTok also raises issues of attention management and access. A platform environment that mixes academic and entertainment content can make it easier to distribute material but also opens the possibility of students switching to unrelated content. The reviews by Caldeiro-Pedreira and Yot-Domínguez (2023) and Yang et al. (2026) caution that educational use needs to consider digital literacy, clear objectives, and the management of platform use. In practice, instructors can pre-select content, provide specific links, assign observation tasks, and direct discussion toward learning indicators. If access or institutional policy is an obstacle, reviewed videos can be provided through an LMS or other media without making the use of a social application a learning objective in itself.

4.3 Strength of Evidence, Research Design, and Analytical Accuracy

Although the change in the mean is numerically large, the one-group pre-test–post-test design does not provide a counterfactual estimate of the results participants might have obtained without the intervention. The change may be related to learning with videos, but it may also be influenced by test repetition effects, exposure to other material, increased attention due to participating in the study, or time factors. Without a comparison group, the relative contributions of these factors cannot be separated. Therefore, the term “improvement after the intervention” can be used to describe the sequence of measurements descriptively, whereas the statement “TikTok caused the improvement” goes beyond the strength of the available design.

Based on the author’s clarification, the pre-test and post-test used the same 15 items. Therefore, both measurements had the same number and content of items; the limitation of differing numbers of items does not apply. The source reports a maximum score of 90 for both measurements, so scoring needs to be applied consistently according to the original instrument guidelines. The mean difference of 40.56 points and the aggregate normalized gain of 0.710 are descriptive summaries. Neither provides significance values or the uncertainty of change without an analysis of paired individual scores.

The author’s clarification states that the pre-test and post-test used the same 15 items. Therefore, this article no longer records a difference in the number of items as a limitation. For transparency, the author still needs to ensure that the answer key, weighting, and scoring procedures were applied consistently. Without individual data or the output of a paired change test, this article does not speculatively reconstruct inferential statistics.

The second issue concerns the inferential analysis. The source reports a regression with pre-test scores as the predictor of post-test scores, namely $R = 0.404$, $R^2 = 0.164$, $B = -0.676$, $t = -2.121$, and $p = 0.045$. This model explains the relationship between initial and final scores according to the reported regression specification; it does not directly test whether the mean change within the same participants differs from zero. Thus, R^2 should not be interpreted as the percentage of TikTok’s effectiveness, and the p-value of the regression coefficient should not be used as evidence of the significance of the pre-test–post-test change.

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The pre-test and post-test means answer a descriptive question about the position of the group's scores at two points in time, while the aggregate normalized gain shows the increase in the mean relative to the available room for improvement. Both indicators are calculated from group means and therefore do not take into account the variation in change for each student. To estimate the uncertainty of the change, each participant's difference score, $D_i = X_{post,i} - X_{pre,i}$, and its standard deviation are required. With these data, a paired t-test can determine whether the mean difference differs from zero, while confidence intervals and paired effect sizes provide information on the precision and magnitude of the change.

Mathematically, the paired t-test uses $t = \bar{D}/(s_D/\sqrt{n})$, with $\bar{D}$ as the mean of individual differences, s_D as the standard deviation of the differences, and n as the number of complete pairs. The 95% confidence interval for the mean change is calculated as $\bar{D} \pm t_{(0.975;\, n-1)} \times s_D/\sqrt{n}$, while the paired effect size can be reported as $d_z = \bar{D}/s_D$. Because individual data or s_D are not available in a recalculable form, these three results cannot be validly calculated from the separate pre-test/post-test means and standard deviations alone. If the distribution of difference scores does not meet the relevant assumptions, the Wilcoxon signed-rank test may be considered.

Table 5. Availability status of the paired change analyses.

Required analysis	Status in the source material	Reporting action
Paired t-test	Output not available	Do not report new t/p values without individual data
Normality of difference scores	Not available	Do not claim that the paired t-test assumptions are met
Confidence interval of the difference	Cannot be calculated	Requires the mean and SD of the differences or paired data
Paired effect size	Cannot be calculated	Requires the SD of the differences or individual data
Aggregate normalized gain	Can be calculated from group means and the maximum score of 90	g = 0.710; a descriptive indicator, not a significance test or a mean individual gain

Transparent reporting also needs to distinguish between statistical significance, the magnitude of change, and practical importance. A small p-value for a regression coefficient indicates evidence against the hypothesis of a zero coefficient in that model, not a measure of how beneficial the media are for learning. Conversely, a large mean difference does not guarantee that the change is reliable if the instruments are not equivalent or the scoring procedure is unclear. Future reports should include the estimated difference with confidence intervals, an effect size appropriate to the design, and information on measurement quality. If individual data become available, reanalysis must follow a plan suited to the research question, rather than choosing the procedure that yields the most favorable conclusion.

The interpretation of the linearity test also needs to be limited to the function of that test. The reported Linearity value is 0.098 and Deviation from Linearity is 0.924. The non-significant deviation value indicates that the test found no evidence of departure from a linear pattern, but the linear component value of 0.098 also did not reach the 0.05 significance threshold.

4.4 Implications for Practice and Agenda for Further Research

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The practical implication that can proportionately be drawn is that short videos deserve consideration as supporting media for introducing or reinforcing OHS concepts, provided that the content is technically reviewed and integrated into structured learning activities. Instructors can use videos to prompt discussion about hazards, consequences, and control actions, and then test the application of that understanding in supervised practice. To maintain accuracy, the material needs to refer to the safety procedures in force in the workshop and must not replace direct instruction, supervision, the use of personal protective equipment, or institutional hazard control. This is consistent with the findings of Hidayat and Wahyuni (2016) on the importance of OHS planning, implementation, and evaluation as part of the management of educational workshops.

It is also necessary to distinguish between learning OHS knowledge and changing the safety culture. Safety culture involves norms, role modeling, procedural compliance, risk communication, and organizational system support. Hidayat and Wahyuni (2016) showed the importance of OHS planning, implementation, and evaluation in educational workshops. Thus, an increase in knowledge scores—even if later confirmed statistically—does not by itself indicate that safe behavior has increased or that the number of accidents has decreased. Media can be one element in building knowledge, but consistent supervision, the availability of personal protective equipment, equipment condition, workshop layout, and follow-up on violations still play a role in risk control.

Learning evaluation should separate several outcomes: declarative knowledge, the ability to identify hazards, the quality of decisions in scenarios, safe behavior during practice, and knowledge retention. Multiple-choice tests mainly provide information about answers to the items presented; they are not sufficient to state that participants apply procedures correctly when facing dynamic workshop conditions. Further measurement can combine validated tests with rubric-based observation, case analysis, or simulation. Separating these outcomes will help determine whether videos merely attract attention, aid conceptual understanding, or also support the transfer of knowledge to safe work behavior.

Analysis planning should be carried out before the data are examined so that researchers do not choose tests based on the most striking results. Such a plan can specify the primary outcome, methods for handling missing scores, assumption checks, sensitivity analyses, and the form of reporting. In studies with small samples, confidence intervals and effect sizes help readers assess the uncertainty of estimates, while visualizing the data distribution can show whether the mean represents most participants or is influenced by extreme values. This practice does not replace design quality, but it clarifies the limits of inference and facilitates replication.

Future research needs to document the content and dosage of the intervention in detail, including the number of videos, duration, topics, order of presentation, accompanying activities, and the time between learning and the post-test. Pre- and post-tests should use equivalent forms or a transparent calibration procedure. If operationally feasible, a comparison group can be used to compare short-video learning with regular instruction or other audiovisual media. The main analysis must be planned based on the research question, accompanied by effect sizes and confidence intervals, and report all relevant results without highlighting only p-values. Follow-up measurement is also needed to see whether understanding persists after learning has ended.

Reporting a replicable intervention also includes the video sources, selection principles, conformity with OHS standards, participant access, and instructor activities. If materials are updated or taken from a platform that changes dynamically, researchers should save versions of

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the content or document access dates so that the evaluated content remains identifiable. This information is important when the study is replicated in other study programs or when the media are used in safety learning that demands technical accuracy. Detailed documentation helps readers judge whether different results stem from the media, the implementation, or the participant context.

The generalizability of these findings is still limited to the reported group, namely 25 students of the 2021 cohort in one study program. The source does not fully explain how participants were selected, the duration of the intervention, or the entire implementation procedure. Therefore, the results cannot be directly generalized to all vocational education students, vocational high school students, workshop workers, or OHS contexts in other industrial fields. Further studies involving more groups, different workshop contexts, and behavioral measurement will provide a stronger basis for determining the conditions under which short videos are beneficial and the limits of their application.

It is also important to distinguish conceptual applicability from statistical generalization. Conceptually, short videos may be considered in various OHS learning contexts because they can depict work situations visually. However, statistical generalization about the magnitude of change requires a supporting sample and design, while practical generalization requires information about participant characteristics, intervention content, workshop facilities, and implementation conditions. Without these details, the most responsible recommendation is to adapt the media contextually and evaluate them in each setting, rather than treating the results for one group as universally applicable evidence.

Overall, this study provides interesting initial results, but the available evidence is stronger for describing differences in scores than for estimating the causal effect of the media. The higher post-test mean may be a reason to conduct further evaluation, while the absence of a control group and the unavailability of a paired change test must remain part of the interpretation. A balanced approach—acknowledging the pedagogical potential of video, linking it to the relevant literature, and limiting claims to the evidence that is actually available—will increase the scientific credibility of the article and help readers assess its practical value and the need for further research.

In addition, the assessment of OHS understanding should ideally link test indicators to the competencies actually required in workshop activities. The blueprint can distinguish the abilities to recognize hazards, understand the hierarchy of controls, select personal protective equipment, follow work procedures, and respond to emergencies. Dividing the indicators in this way helps researchers see which aspects have developed and which still require learning. If the instrument produces only a single total score, information about participants' patterns of strengths and weaknesses is limited. In future studies, reporting scores by domain can provide a more diagnostic picture, provided that the number of participants and the quality of the instrument support such analysis.

The strength of this article lies in its effort to present the results that are actually available and to place them in the context of the literature on digital learning and OHS in educational workshops. Its limitation is that the summary data do not allow independent examination of each score, test equivalence, or paired change analysis. This limitation should be maintained until source documentation becomes available. In scientific reporting standards, disclosure of limitations is not an editorial weakness to be concealed but part of the transparency that allows readers to judge how far the results can be trusted and replicated. With this approach, the article can still make an initial contribution without turning a descriptive indication into an unproven claim of effectiveness.

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Within the framework of knowledge development, initial results that are not yet conclusive can still be useful if their questions and limitations are formulated precisely. This article documents a summary of scores before and after the use of the media and identifies the need to improve the measurement design. Its added value lies not in claiming that a particular platform is certainly effective, but in explaining how the evaluation of OHS media should be designed so that it can be tested and replicated. This approach is in line with systematic reviews of TikTok that encourage cross-context research, more diverse outcome measurement, and attention to implementation conditions (Caldeiro-Pedreira & Yot-Domínguez, 2023; Yang et al., 2026).

Distinguishing indicators will also strengthen the alignment between objectives, learning activities, and evaluation. If the learning objective is to identify hazards, test items need to measure the ability to read situations and recognize sources of hazards, not merely recall definitions. If the objectives include decision-making, students need to be given scenarios that require them to choose preventive actions and justify them. With such alignment, scores are more likely to represent the intended learning outcomes. This principle is also consistent with the planned use of multimedia: visuals are selected to support the target understanding, while follow-up activities are used to ensure that participants process the information actively (Mayer, 2024).

Ultimately, research on OHS learning media needs to connect three layers of evidence: the quality of the teaching materials, changes in learning outcomes, and the application of knowledge in action. Expert review can examine content accuracy; equivalent tests can measure changes in knowledge; and practice observation can assess relevant behavior. These three layers complement each other but cannot replace each other. By reporting each separately, researchers can avoid drawing overly broad conclusions from a single indicator and provide study program managers with more useful information for deciding whether the media need to be revised, combined with practice, or tested in a stronger design.

5. CONCLUSION AND SUGGESTIONS

Among the 25 students reported in the source, the mean OHS understanding score increased descriptively from 32.88 on the pre-test to 73.44 on the post-test, a difference of 40.56 points. Based on the maximum score of 90, the aggregate normalized gain calculated from group means is 0.710. This value is a descriptive indicator, not the result of an inferential test. Because individual data and paired test output are not available, the significance of the change, confidence intervals, and paired effect sizes cannot yet be established. The absence of a control group also means that the change cannot be definitively attributed to TikTok media.

The source reports a Cronbach's alpha of 0.859 for the pre-test and 0.871 for the post-test, as well as normality test results for each measurement with p-values above 0.05. The available regression yielded $R^2 = 0.164$, $B = -0.676$, $t = -2.121$, and $p = 0.045$; these results only describe the relationship between initial and final scores in the reported model, not a test of paired change. Further research needs to use complete paired data, examine the distribution of difference scores, report a paired t-test or Wilcoxon test as appropriate to the assumptions, and add a comparison group if it aims to test the effect of the intervention more rigorously.

According to the author's clarification, the pre-test and post-test used the same 15 items. The available results show an increase in the mean and the aggregate normalized gain at the group level, but do not yet provide a verifiable test of paired change. TikTok audiovisual media can be considered as a support for OHS learning; further research needs to analyze complete paired data

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using a paired t-test or an appropriate alternative, report confidence intervals and effect sizes, and add a comparison group if it aims to test the contribution of the intervention more rigorously.

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