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MULTIMEDIA LEARNING IN HEALTH EDUCATION: HOW AUDIOVISUAL MEDIA IMPROVE PSYCHOMOTOR SKILL DEVELOPMENT IN MASSAGE TRAINING

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ABSTRACT

More than 50% of students enrolled in the massage course during the 2022/2023 academic year failed to meet expected competency standards, with deficiencies identified in practicum performance, technical precision, procedural comprehension, and fine motor skills. This study investigated the effectiveness of audiovisual instructional media in enhancing massage skill acquisition among vocational education students. Grounded in multimedia learning theory, audiovisual media are posited to facilitate efficient knowledge transfer by integrating visual demonstration with auditory explanation, thereby supporting cognitive processing and psychomotor development. A quasi-experimental design with a post-test-only control group was employed. The sample comprised 108 students, randomly assigned to an experimental group receiving audiovisual-based instruction and a control group receiving conventional demonstrations. Massage competency was assessed using a structured observation sheet evaluating technical accuracy, procedural sequence, and motor coordination. Data normality was confirmed via the Shapiro–Wilk test, followed by an independent-samples t-test for group comparison. Results revealed that the experimental group achieved a significantly higher mean score ($M = 87.92$, $SD = 3.863$) compared to the control group ($M = 83.52$, $SD = 5.215$), with a statistically significant difference ($t = 4.87$, $p < 0.001$). These findings demonstrate that audiovisual instructional media positively influence students' mastery of massage skills by enhancing procedural clarity, reducing cognitive load, and enabling repeated visual rehearsal. The study concludes that integrating audiovisual resources into vocational health curricula can effectively address competency gaps and improve practical skill outcomes. Educators and curriculum designers are encouraged to adopt multimodal instructional strategies to support psychomotor learning in competency-based education contexts.

Introduction

Higher education institutions are expected to produce graduates who possess not only theoretical competence but also practical skills required in the workplace. From an economic geography perspective, the human capital approach treats skills as resources that can be measured using quantitative proxies (Warren & Gibson, 2023). One such competence is massage skill, which constitutes an important component of fitness science, sports therapy, and holistic health services. At the Faculty of Sports Science, Universitas Negeri Padang (FIK UNP), massage is regarded as a pragmatic subject that necessitates an understanding of human anatomy and the employment of proper, standardized manual techniques. However, in practice, the teaching of massage continues to face several obstacles. The methods commonly used remain conventional, consisting mainly of lectures and direct demonstrations by lecturers, without adequate instructional media. As a result, students often find it difficult to remember and imitate the techniques taught because the learning experience is presented only once and cannot be revisited independently. In addition, the limited time available for classroom practice prevents students from developing their skills optimally. Therefore, engaging instructional media is essential, as learning media constitute an essential component of the instructional process (Wulandari et al., 2023).

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The use of video media in learning is highly important because it provides students with a direct representation of the material delivered by lecturers and examples of its practical application (Selvani et al., 2024). Students also demonstrate different learning styles (Wahyuni, 2017). Most current students are digital natives and tend to respond better to visual and interactive media. The learning process becomes more effective when the media used align with learners' characteristics (Gianistika et al., 2020). Audio-visual media play an important role in instruction due to their many advantages in supporting learning (Deria et al., 2024). Visual and audio-visual media can present learning material in a more engaging and concrete manner (Huang et al., 2024), stimulate more of students' senses, and thereby make information easier to understand and remember.

In the context of skill-based learning, such as massage, Heinich et al. (2002) state that instructional media displaying real demonstrations, such as videos, can bridge the gap between theory and practice. Massage involves a range of techniques, including friction, pressure, rubbing, holding, pinching, and kneading (Chen et al., 2019). Massage has the potential to alleviate inflammatory processes, accelerate recovery, and reduce pain associated with muscle injuries (Waters-Banker et al., 2014). It is also frequently used in sports for recovery and to prepare athletes for subsequent competitions (Dakić et al., 2023).

With the support of audio-visual media, students can observe techniques repeatedly and examine details of hand movements, pressure application, and body positioning more clearly. This provides greater opportunities for students to improve their skills independently outside regular class hours. Initial observations in the massage course at FIK UNP indicated that many students were still unable to apply massage techniques correctly despite instruction from lecturers. This demonstrates that the learning process has not yet fully succeeded in effectively transferring practical skills. Some students reported difficulty in remembering the sequence of movements and felt less confident during practice due to a lack of opportunities for high-quality independent practice. The absence of supporting media appears to be one of the primary factors hindering their learning process.

Furthermore, in the post-pandemic period, the use of digital media in learning has continued to increase. Many educational institutions have begun integrating technology into instruction to reach students in more flexible and adaptive ways. The use of specially developed massage tutorial videos that comply with scientific and technical standards may offer a learning solution that is both modern and effective in building students' practical skills. Therefore, it is important to investigate the effectiveness of audio-visual instructional media in improving the massage skills of FIK UNP students. Learning media are any tools or materials used in instruction to help students understand and master subject matter (Nababan et al., 2023). Audio-visual-based learning media can be accessed anywhere and can make the presentation of instructional content more engaging, resulting in a more enjoyable learning experience that is easier to remember (Lange & Costley, 2020).

This research aims to provide empirical evidence on the extent to which such media can enhance instructional quality and address the long-standing challenges faced by both students and lecturers. Furthermore, the study aligns with the constructivist learning paradigm, in which students are expected to become active participants in their own knowledge construction. Audio-visual media facilitate independent learning, allow students to explore unfamiliar techniques, and enable reflection on mistakes by replaying instructional content. Accordingly, this investigation focuses on the impact of audio-visual instructional media on students' massage skills, as assessed by their practical performance after its application. The results are expected to provide valuable insights for educators at FIK UNP in developing more innovative, technology-oriented pedagogical strategies, especially in practical disciplines that require mastery of physical skills.

Materials and Methods

This study employed a quantitative approach utilizing a quasi-experimental design with a posttest-only control group framework. This design was selected to evaluate the causal impact of the instructional intervention on students' practical massage competencies while accounting for intact classroom assignments that precluded random allocation. The target population comprised all undergraduate students enrolled in the mandatory massage course at the Faculty of Sports Science (FIK) during the January–June 2024 academic semester. From this population, a purposive sampling

technique was applied to select participants who met predetermined inclusion criteria, including regular course attendance, absence of prior professional massage training, and explicit consent to participate in the experimental protocol. This sampling strategy ensured that the selected cohort possessed a homogeneous baseline relevant to the study's objectives, thereby enhancing the internal validity of the comparative analysis between the experimental and control groups.

The primary instrument for data collection was a structured observation sheet specifically designed to assess students' practical massage skills across multiple competency domains, including technique accuracy, procedural sequencing, pressure modulation, and client communication. Prior to implementation, the instrument underwent rigorous psychometric evaluation to ensure measurement quality. Content validity was established through expert judgment, while reliability was confirmed using inter-rater consistency testing, yielding a coefficient that met the minimum threshold for educational skill assessment. Concurrently, the audiovisual instructional media developed for the experimental group was subjected to a comprehensive validation process by three independent experts: a subject-matter specialist in sports massage pedagogy, a media technology expert, and a language/communication specialist. The validation process evaluated the media's instructional alignment, technical quality, visual clarity, and linguistic appropriateness. All experts concluded that the video materials were highly suitable for implementation, with minor pedagogical revisions incorporated to optimize instructional effectiveness.

The intervention was administered over a structured instructional period aligned with the university's academic calendar. The experimental group received massage skill training supplemented by the validated video-based instructional media, which provided step-by-step demonstrations, anatomical references, and self-paced review capabilities. In contrast, the control group followed the conventional face-to-face demonstration method traditionally employed in the curriculum. Following the completion of the instructional phase, both groups underwent a standardized practical assessment. Trained evaluators, blinded to group allocation, utilized the validated observation sheet to record performance scores. This posttest-only configuration minimized pretest sensitization effects and ensured that observed differences in skill acquisition could be more confidently attributed to the instructional medium rather than prior testing exposure.

Quantitative data were processed and analyzed using IBM SPSS Statistics. Prior to hypothesis testing, the assumption of normality was examined using the Shapiro–Wilk test, which is particularly robust for educational sample sizes. Upon confirmation of normal distribution, an independent-samples t-test was conducted to compare the mean posttest scores between the experimental and control groups. The significance level was set at $\alpha = 0.05$ to determine whether the video-based instructional intervention yielded a statistically significant improvement in practical massage competencies compared to conventional instruction. Effect size metrics were also calculated to evaluate the practical significance of the findings, ensuring that conclusions were grounded not only in statistical probability but also in pedagogical relevance.

Results and Discussion

This study was conducted among Sports Education students enrolled in the massage course during the January–June 2025 semester, with a total sample of 108 students across the experimental and control groups. The experimental group received instruction using video-based learning media, whereas the control group received manual instruction. In the experimental group (n = 60), the mean score was 87.92, with a standard deviation (SD) of 3.863. In the control group (n = 48), the mean score was 83.52, with a standard deviation (SD) of 5.215. The results are presented in the tables below.

Score Interval	Category	Frequency	Percentage (%)
80–83	Low	6	10
84–87	Moderate	18	30
88–91	High	24	40
92–95	Very High	12	20

Total	60	100

Table 1. Frequency Distribution of Students' Massage Skills (Experimental Group)

The frequency distribution presented in Table 1 reveals a positively skewed pattern of skill acquisition among students in the experimental group. Notably, 60% of participants achieved scores in the high (40%) and very high (20%) categories, indicating that the majority demonstrated proficient mastery of massage techniques following exposure to video-based instructional media. This concentration of scores in the upper performance bands suggests that audiovisual resources effectively supported procedural learning by providing visual modeling, sequential demonstration, and opportunities for repeated observation, key mechanisms aligned with Mayer's (2009) cognitive theory of multimedia learning. The relatively low proportion of students in the low category (10%) further underscores the potential of audiovisual media to reduce initial skill acquisition barriers, particularly for psychomotor tasks requiring fine motor coordination and spatial awareness.

Score Interval	Category	Frequency	Percentage (%)
80–83	Low	6	10
84–87	Moderate	18	30
88–91	High	24	40
92–95	Very High	12	20
Total		**60**	**100**

Table 2. Frequency Distribution of Students' Massage Skills (Control Group)

In contrast, the frequency distribution for the control group (Table 2) displays a more dispersed pattern, with the largest proportions distributed across the high (33.3%) and moderate (29.2%) categories, and a notable 20.8% of students remaining in the low performance category. This broader dispersion suggests greater variability in skill outcomes when instruction relies solely on manual demonstration without audiovisual supplementation. The higher representation in the moderate and low categories may reflect limitations inherent in traditional demonstration methods, such as restricted viewing angles, inability to replay complex sequences, and reduced opportunities for self-paced review (Clark & Mayer, 2016). These findings imply that while conventional instruction can achieve satisfactory outcomes for some learners, it may be less effective in ensuring consistent skill acquisition across diverse student populations.

To determine whether the observed differences in performance distributions between the experimental and control groups reflect statistically significant effects of the instructional intervention, inferential statistical analysis was conducted. Table 3 presents the descriptive statistics and group comparisons underlying the hypothesis test.

Class	N	Mean	Std. Deviation	Std. Error Mean
Video Class	60	87.92	3.863	.499
Manual Class	48	83.52	5.215	.753

Table 3. Independent-Samples t-Test Results (Group Statistics)

The group statistics in Table 3 indicate a meaningful difference in mean performance between the experimental group (M = 87.92, SD = 3.863) and the control group (M = 83.52, SD = 5.215). The higher mean score in the experimental group, coupled with a smaller standard deviation, suggests that video-based instruction not only elevated average skill levels but also produced more consistent learning outcomes across participants. The standard error of the mean (.499 for experimental vs. .753 for control) further reflects greater precision in estimating the population mean for the experimental condition, reinforcing the stability of the observed effect. These descriptive patterns provide preliminary support for the hypothesis that audiovisual media enhance massage skill acquisition, though formal hypothesis testing is required to confirm statistical significance.

Hypothesis Assumption Testing

Normality was tested using the Shapiro–Wilk test in SPSS. If $p > 0.05$, the data are considered normally distributed. The results indicated that the data for each variable were normally distributed.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Massage Assessment Results	Equal variances assumed	6.211	.014	5.030	106	.00	4.396	.874	2.663	6.128
	Equal variances not assumed			4.869	84.379	.00	4.396	.903	2.600	6.191

Table 4. Independent-Samples Test

Prior to interpreting the t-test results, assumptions of normality and homogeneity of variance were evaluated. The Shapiro–Wilk test confirmed that scores in both groups were normally distributed ($p > 0.05$), satisfying the parametric requirement for t-test analysis. However, Levene's test for equality of variances yielded a significant result ($F = 6.211$, $p = .014$), indicating heterogeneous variances between groups (Table 5). Consequently, the "Equal variances not assumed" row in Table 4 was consulted for hypothesis testing. The independent-samples t-test revealed a statistically significant difference between groups ($t(84.379) = 4.869$, $p < .001$), with a mean difference of 4.396 points (95% CI [2.600, 6.191]). This effect size, interpreted as large according to Cohen's (1988) conventions ($d \approx 0.94$), provides robust evidence that video-based instructional media significantly improve massage skill outcomes compared to manual demonstration alone. The findings align with Susilo's (2020) assertion that audiovisual resources enhance conceptual understanding and procedural fluency by supporting dual-channel processing and reducing cognitive load during skill acquisition.

Levene Statistic	df1	df2	Sig.
6.245	1	106	0.014

Table 5. Homogeneity Test

Based on the table above, the significance value (Sig.) was 0.014, which is smaller than the significance level of 0.05. This indicates that the variance between the experimental and control groups was not homogeneous. Therefore, in the independent-samples t-test analysis, the researchers referred to the “Equal variances not assumed” row to obtain more accurate results. The significance value remained at 0.014 (<0.05), indicating that the test result remained significant. Thus, it can be concluded that there was a significant difference between the group that used audio-visual media and the group that did not. Instructional media play a very important role because their presence in the teaching and learning process can help students more easily grasp fundamental concepts and knowledge from learning materials (Susilo, 2020). One reason to use audio-visual media is that they can help train students’ concentration and focus on the material being taught, especially on basic massage techniques. It can therefore be stated that the post-test results of the experimental class showed greater improvement than those of the control class. Accordingly, learning with audio-visual media can be considered more effective than learning without them.

Discussion

To enhance the quality of practicum-based learning at the Faculty of Sports Science, Universitas Negeri Padang (FIK UNP), with particular emphasis on mastering massage skills, this study investigates the effectiveness of audiovisual instructional media. Massage, as an essential skill in sports education, necessitates an accurate comprehension of techniques, refined coordination, and precision in each movement sequence. Accordingly, the mode of material delivery holds a significant role in facilitating successful learning outcomes. This study involved two groups of students. The first group, the experimental group, consisted of 60 students who received instruction in massage skills through video media. The second group, the control group, consisted of 48 students who received instruction through conventional methods involving only verbal explanation and direct demonstration by the lecturer. Conventional instruction generally depends on students' ability to capture and remember movements from a single demonstration, which may not provide sufficient understanding, especially for students with visual learning preferences or those who require repeated exposure.

The results showed that the mean massage-skill score of students in the experimental group was 87.92 with a standard deviation of 3.863. In contrast, the control group obtained a mean score of 83.52 with a standard deviation of 5.215. This substantial difference in mean scores provides an initial indication that video media contributed to improved student learning outcomes. To confirm the validity of this finding, a normality test was conducted using the Shapiro–Wilk test, which showed that the data from both groups were normally distributed. Thus, parametric hypothesis testing can continue. Further analysis was carried out using the independent-samples t-test to determine whether the difference between the two groups was statistically significant. The test result showed a significance value of 0.000, which is far below the predetermined alpha level ($\alpha = 0.05$). This provides strong evidence of a significant difference in massage learning outcomes between students taught via video media and those taught manually. In other words, the use of audio-visual instructional media had a positive effect on the improvement of massage skills.

These findings are consistent with educational perspectives suggesting that massage is a manual therapeutic method that involves pressure, stretching, and rubbing of body tissues to improve blood circulation, reduce muscle tension, and provide comfort and relaxation (Akhtar et al., 2023; Fajardo et al., 2022). Therapeutic massage is also regarded as a means of supporting muscle recovery and physiological, psychological, and performance aspects in sports (Gasibat et al., 2024). It may also be understood as a method of maintenance or healing that uses hand movements or tools applied to the body's soft tissues. There remains a knowledge gap regarding attitudes and perceptions toward massage therapy among undergraduate pre-professional health sciences students (Munk et al., 2020). Therefore, changes in the teaching of massage courses are needed, including the use of engaging instructional media, such as audio-visual media (video).

The use of audio-visual learning media is also regarded as a means to enhance students' motivation to engage in learning activities, as such media can generate animated presentations that combine auditory and visual elements. (Amelia & Manurung, 2022). Video is an electronic medium that integrates audio and visual technologies simultaneously, producing dynamic and engaging displays (Yudianto, 2017). Practically, using video in massage instruction enables students to replay the demonstrated movements, observe details that may be missed in live demonstrations, and study independently outside class hours. This flexibility gives students more room to develop their skills at their own pace, which is especially important because each student has different learning characteristics.

Conclusions

Based on the data analysis, this study empirically demonstrates that the use of audio-visual media has a significant positive impact on students' mastery of massage skills. This finding is supported by the results of a t-test, which showed a significant difference between the experimental and control groups. This confirms that the integration of audio-visual media not only improves procedural understanding but also accelerates the acquisition of psychomotor skills. Thus, this media has proven

effective as a pedagogical tool capable of bridging the gap between theory and practice in learning applied skills.

Theoretically, this finding aligns with the principles of multimedia learning, which emphasize that presenting information through simultaneous visual and auditory channels can reduce cognitive load and facilitate deeper information processing. In the context of vocational health education, this suggests the need for a paradigm shift in teaching from conventional demonstration methods to a more interactive and adaptive multimodal approach. Audio-visual media should not simply serve as a substitute for instructors but also as a catalyst, enabling students to independently repeat, observe techniques in detail, and internalize standard operating procedures in a more systematic and measurable manner.

The practical implications of this study emphasize the importance of the readiness of lecturers and educational institutions to integrate learning technology into the massage skills curriculum. Lecturers are advised to proactively develop and utilize audio-visual media that are structured, relevant to the clinical context, and tailored to students' competency levels and learning styles. Furthermore, pedagogical capacity development is needed for teaching staff to optimize the effective use of these media, including designing visual evidence-based learning scenarios, providing timely feedback, and continuously evaluating skill progress through standardized observation instruments.
While this study provides a strong empirical contribution, it is acknowledged that the sample size and learning context are limited, so generalizing the findings to other health vocational study programs requires further validation. Future research is recommended to explore the long-term effectiveness of audio-visual media, test variations in content formats (such as interactive simulations or augmented reality), and analyze their impact on learning motivation, skill retention, and graduates' employability. Overall, this study confirms that digital transformation in skills education should not be viewed as an add-on, but rather as a strategic imperative for producing competent, adaptable healthcare professionals prepared to meet evolving professional practice standards.

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