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ANIMATION MEDIA FOR DIGITAL AUDIT EDUCATION: ENHANCING LEARNING OUTCOMES AND SUSTAINABLE PROFESSIONAL COMPETENCE

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Abstract

Auditing and assurance, inherently complex and abstract, present significant pedagogical challenges in preparing accounting professionals for the digital era. This study developed and evaluated animation media as an innovative solution to enhance digital audit learning. Using the ADDIE Model, 10 animation lessons were created and tested with 60 Bachelor of Accounting students, who were split into experimental and control groups. Data from pre- and post-tests and satisfaction questionnaires revealed that the animation media achieved high efficiency ($E1/E2 = 84.90/88.30$), surpassing the 80/80 standard. Crucially, the experimental group demonstrated significantly higher academic achievement post-intervention (a 10.62-point difference, $p < .001$) and reported the highest satisfaction (an overall mean of 4.76/5.00). These findings indicate that animation media are highly effective for improving understanding, analytical thinking, and ethical judgment in complex professional courses. It fosters sustainable learning, better preparing accountants for the evolving digital landscape. This innovation significantly contributes to interdisciplinary and sustainability goals of education and professional development in the Asian context.

Keywords: Animation Media, Audit Education, Digital Learning, Learning Outcomes, Sustainable Education

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Introduction

Contemporary accounting education has evolved from rote memorization of content to the development of analytical skills, logical thinking, and ethical professional judgment. This shift is crucial for equipping accountants to adapt and make responsible decisions in complex, rapidly changing contexts (Muslim, 2024). Twenty-first-century learning emphasizes equipping students with holistic competencies, including knowledge, information technology skills, and lifelong learning skills. This is particularly vital in auditing and assurance courses, which are fundamental to the development of professional and ethical accountants. However, many current curricula still predominantly emphasize memorizing standards, audit processes, and theoretical definitions. While these provide a foundational understanding, they often fall short in facilitating the continuous practical application of knowledge (Askary & Askarany, 2024).

Consequently, many students struggle with long-term knowledge retention. They may temporarily recall information but are unable to apply it effectively in complex, dynamic environments, particularly those involving information technology and business processes that align with the evolving economy and society. Furthermore, the inherently abstract nature of these subjects, when paired with insufficient creative and engaging supplementary media such as interactive case studies, simulations, multimedia, or active learning activities, often leads students to perceive the content as detached from reality, thereby reducing their self-motivation to learn (Churyk et al., 2024). The systematic review of knowledge is also critically important, especially in process-oriented subjects like auditing and assurance. Without an appropriately structured review, whether through case study exercises, audit process simulation models, or linking content to real-world scenarios, students tend to retain information only temporarily and struggle to transfer knowledge to new situations, ultimately diminishing overall learning efficiency. Research in accounting education highlights a persistent gap between content-driven teaching methods and students' demand for active learning experiences (Tavares et al., 2023).

This predicament underscores the need to develop instructional models that effectively address subject complexity and foster deep learning among students in the digital age. Educational animation, in particular, emerges as a vital tool for visualizing abstract concepts, making them easier to comprehend and significantly enhancing motivation to learn. Over the past decade, the development of innovative educational media has played a prominent role, with educational animation standing out for its ability to convey complex content through simulations and interactive motion graphics, thereby simplifying understanding. Animation media not only help reduce students' cognitive load but also create simulated experiences conducive to active and long-term self-directed learning. It further supports deep learning by enabling students to visualize sequential steps, analyze relationships among data, and construct mental models that systematically connect theory to practical application (Ploetzner, 2024). Thus, animation media is not merely a supplementary teaching tool; it is a learning innovation that stimulates analytical thinking, helps learners memorize operational steps, and provides simulated experiences that closely resemble real-world situations. It aligns with digital learning trends emphasizing student engagement at every stage of the learning process. Empirical evidence also suggests that animation media improves learning outcomes by enabling students to focus better and grasp overall concepts more effectively, alongside fostering more positive attitudes towards learning (Beautemps et al., 2025).

Building upon the aforementioned background and challenges, the development of animation media tailored to the characteristics of auditing and assurance courses can systematically facilitate students' in-depth understanding of the subject matter. It can provide a comprehensive overview of the auditing process from planning to reporting and cultivate analytical thinking and ethical decision-making skills within the professional accounting context. Therefore, this

research aims to develop animation media, evaluate its effectiveness, compare students' learning achievement between the experimental and control groups, and assess students' satisfaction with the animation media. The ultimate goal is to enhance learning in auditing and assurance for Bachelor of Accounting students at Yala Rajabhat University, providing a guideline to elevate the quality of accounting education and meet the demands of the evolving digital professional world. Beyond addressing learning development needs, this study offers novelty and a creative contribution, clearly distinguishing itself from general educational media research. It focuses specifically on developing animation media for auditing and assurance, subjects characterized by process-oriented, complex content requiring high professional judgment. A literature review revealed limited research within Thai accounting education that directly designs animation media aligned with the structure of the audit process. This study bridges that gap by integrating conceptual frameworks from the Cognitive Theory of Multimedia Learning (CTML) and Visuospatial Working Memory into the design of auditing animation media, enabling the systematic conveyance of abstract concepts and operational procedures. Furthermore, it develops a set of 10 animation lessons covering key subject content, with the potential to be scaled into standardized learning packages for accounting curricula and implemented sustainably in university teaching contexts. Thus, this research is not merely the development of general educational media but the creation of a specialized learning innovation in auditing, underpinned by a clear theoretical foundation, tested with actual students, and possessing the potential to scale up and further enhance the quality of accounting education in the digital age.

Literature Review

The concepts of learning development and student learning are fundamental to digital age instruction. In this era, the student's role extends beyond mere content memorization; it encompasses critical thinking, reasoning, decision-making, and the contextual application of knowledge (Muslim, 2024). This aligns with adult learning and experiential learning principles, which emphasize student participation, reflective processes, and the practical application of knowledge. Research in the digital age indicates that modern learners should possess digital learning competence—the ability to utilize technology and digital media for self-directed inquiry, comprehension, and knowledge creation. Song et al. (2025) found a significant positive correlation between digital learning competence and academic achievement, particularly among higher-education students, suggesting that digital skill development is integral to enhancing learning. Furthermore, student engagement is a crucial factor in effective learning. Actively engaged students, both behaviorally, cognitively, and emotionally, in online learning tend to perform better, achieve higher academic results, and report greater satisfaction compared to those who are less interactive with instructors or peers and less involved in learning activities (Nia et al., 2023). Therefore, in the context of complex subjects like auditing and assurance, students need to develop knowledge, skills, and attitudes that transition from rote learning to reasoning- and judgment-based learning, aligning perfectly with contemporary learning and development paradigms.

In the digital age, concepts and theories related to digital and animation-based learning media have attracted significant interest for their ability to simplify complex content through motion graphics, simulations, and engaging learning experiences. Mayer (2024) explains that the Cognitive Theory of Multimedia Learning (CTML) posits that humans learn best when information is presented simultaneously through both visual and auditory channels. Our brains have two distinct processing channels—visual and verbal—each with limited capacity. Thus, when multimedia is designed to complement information across both channels appropriately, learners can readily select essential information, organize it systematically, and connect new data with existing knowledge, leading to deeper understanding and longer retention.

Additionally, the capacity of visuospatial working memory is crucial for learning from animation, especially when the content is highly complex. Ploetzner (2024) explains that students' ability to remember and evaluate visuospatial memory affects learning from animation more than their perceived cognitive load. This highlights the critical importance of cognitive processing and perception for effective learning through animated visuals. Similarly, Hegarty & Just (1993) and Hegarty et al. (2003) describe that while viewing animation, the brain constructs two types of mental models: a kinematic model, an internal representation of movement and event sequences, and a conceptual model, an internal representation for understanding relationships and underlying principles. Both models facilitate easier comprehension of changes within the animation and enable systematic reasoning. Lawson & Mayer (2024) found that requiring students to summarize while learning from animation significantly improved academic achievement compared to passive viewing, whereas merely drawing did not. Therefore, applying these concepts to auditing and assurance courses, which require students to understand work processes and various components and to make ethical judgments, demonstrates that animation media is a suitable option. It helps students clearly visualize operational steps, easily grasp principles, and retain content more effectively than traditional instructor-led teaching.

Evaluating the efficiency of instructional media (E1/E2) and student satisfaction are key components of developmental research (R&D). The E1 and E2 criteria are commonly used to measure media efficiency, where E1 refers to the Efficiency of Process and E2 to the Efficiency of Product. These criteria collectively reflect the quality of the instructional management process and the overall student learning outcomes (Brahmawong, 2013). For instance, Boonchu et al. (2025) studied animated media for learning, designed in accordance with the principles of CTML and Cognitive Load Theory (CLT). Their research found that the developed media exhibited efficiency values (E1/E2) significantly above the 80/80 standard, indicating that appropriately designed animation media can help students better understand difficult and complex content, both in terms of learning processes and outcomes. Similarly, Damjub (2023) developed animation media for ADDIE-based instruction and found that the media's efficiency met the 80/80 standard, with evaluations covering both learning processes and outcomes after practical use. This research demonstrated that animation media, when appropriately designed for learning sequences and content, significantly enhance students' academic achievement and promote a deeper understanding of complex content more effectively than text-based media. Regarding student satisfaction, this is a vital process for evaluating the quality of instructional media, as it reflects students' experiences and attitudes toward using the media and directly impacts their motivation and learning outcomes. Davis (1989) posited that satisfaction stems from perceived usefulness and perceived ease of use, which in turn influence attitudes and intentions for repeated use. Furthermore, DeLone & McLean (2003) identified user satisfaction as a critical indicator of information system success, influenced by system quality, information quality, and service quality. From a digital learning perspective, research indicates that student satisfaction is related to the quality and format of animation media. Ningrum et al. (2024), who developed and utilized animated video media for elementary literature instruction, reported that over 78% of students found it enjoyable, easy to understand, and more engaging in lessons. Likewise, Aupara et al. (2023) developed and evaluated animation media, finding it of high quality and that students were highly satisfied. This demonstrates that animation media can significantly foster both learning efficiency and student motivation. Therefore, employing E1/E2 efficiency measurement tools alongside satisfaction questionnaires allows for a comprehensive evaluation of both media quality and student experience, supporting developmental recommendations and validating the effectiveness and acceptance of the developed innovation.

Research Hypotheses

H1: The developed animation media will achieve efficiency values (E1/E2) meeting the 80/80 standard for instructional media efficiency.

H2: Students instructed using animation media will demonstrate significantly higher post-learning academic achievement compared to students instructed using conventional teaching methods.

H3: Students instructed using animation media will exhibit higher satisfaction with the animation media.

Conceptual Framework

Input	Process	Output
- Course content in Auditing and Assurance - Principles of multimedia instructional design and multimedia learning theories - Animation production technologies - Target Group: Bachelor of Accountancy Students, Yala Rajabhat University - Evaluation Instruments: Pre-test, Post-test, Student Satisfaction Questionnaire	- Analysis - Design - Development - Implementation - Evaluation	- Animation-based instructional media developed to enhance learning in the Auditing and Assurance course - Media Effectiveness (E1/E2) - Student Satisfaction with Media Usage

Figure 1 Conceptual Framework

Research Methodology

Population and Sample

This research employed a Quasi-Experimental Design with a pretest-posttest control group approach to evaluate the development of animation media. The population comprised Bachelor of Accounting students at Yala Rajabhat University enrolled in the Auditing and Assurance course during the 2025 academic year. A purposive sampling method was initially used to select two intact sections comprising 60 students in total. Subsequently, a simple random assignment method was applied at the class level to designate one section of 30 students as the experimental group and the other as the control group. Inclusion criteria included: 1) enrollment in the specified Auditing and Assurance course for the academic semester, 2) full participation in learning activities as per the instructional plan, and 3) voluntary informed consent to participate in the research. Exclusion criteria included students who missed essential tests or questionnaires, resulting in incomplete data that could affect analysis.

Scope of Content

The researchers designed and developed ten animation media modules. The content covered in these modules included: 1) General Concepts and Framework of Assurance Engagements, 2) Laws and Decrees Related to Auditing, 3) Professional Ethics and Responsibilities of Auditors, 4) Fraud, Errors, and Audit Risk, 5) Evidence Risk Assessment, 6) Auditing Techniques, 7) Evidence Collection, Verification, and Audit Sampling Methods, 8) Transaction Cycle Auditing, 9) Certified Public Accountant's Report (Auditor's Report), and 10) Computer-Assisted Auditing and Audit Quality Control.

Data Collection

The research instruments included:

1) Animation media: The animation media developed for this research followed the ADDIE Model (Seels & Glasgow, 1997), encompassing the phases of Analysis, Design, Development, Implementation, and Evaluation. Adobe After Effects, Adobe Illustrator, and Adobe Premiere Pro were used to create animations, graphics, and audio. Each animation module was designed as a narrative through animated visuals and voice-overs to convey abstract concepts and sequential audit processes clearly and understandably. The developed animation media underwent a quality evaluation by three experts in accounting and educational research to assess content consistency, instructional design suitability, presentation clarity, and appropriateness for the target student level. Based on expert recommendations, the researchers refined the media during the development phase to ensure its completeness before practical implementation. Additionally, the researchers designed an instructional plan that integrates animated media as supplementary teaching material for each module of the Auditing and Assurance course. This plan aligned with the course's learning outcomes and the Higher Education Qualification Standards Framework 2022, ensuring that the learning and evaluation processes covered the competencies prescribed by the curriculum.

2) Learning achievement tests: These included pre-tests and post-tests. The pre-test was administered to both the experimental and control groups to measure baseline knowledge before instruction, and its scores were used as a covariate in the Analysis of Covariance (ANCOVA). The post-test was administered to both groups after completing all modules to measure post-learning academic achievement. All tests consisted of 4-option multiple-choice questions developed from a unified question bank and covering content from all 10 animation modules. Question order and answer options were randomized to prevent memorization. The content validity of these tests was verified by three experts, yielding an average Item Objective Congruence (IOC) index of 0.88. Subsequently, a pilot study was conducted with 30 Bachelor of Accounting students, similar to the main sample, to evaluate test quality. The test's difficulty (P) ranged from 0.30 to 0.77, with an average of 0.51, indicating moderate difficulty. The discrimination index (r) ranged from 0.10 to 0.79, with an average of 0.46, indicating that the test effectively differentiated between high and low-achieving students. Furthermore, the test's overall reliability, calculated using the KR-20 formula, was 0.97, indicating excellent reliability and suitability for collecting actual research data.

3) Student satisfaction questionnaire: A student satisfaction questionnaire regarding the animation media was used to assess satisfaction across various aspects, including content comprehension, media appeal, appropriateness of visuals and audio, ease of use, and motivation/learning engagement. A 5-point Likert scale was employed. Data were collected from students in the experimental group after their learning experience with the animation media. The content validity of this questionnaire was confirmed by three experts, yielding an average IOC index of 0.87. A pilot study with 30 Bachelor of Accounting students, similar to the main sample, yielded a Cronbach's alpha of 0.88, indicating good reliability and suitability for data collection.

Data collection was conducted during the 2025 academic year. The sample was divided into an experimental group and a control group. Both groups received instruction on the same course content, with the experimental group additionally utilizing the animation media as supplementary learning material. Before instruction began, both groups took a pre-test to measure their baseline knowledge, with the scores used as a covariate in the Analysis of Covariance (ANCOVA). Subsequently, the experimental group received instruction incorporating the animation media alongside standard teaching, while the control group received instruction using standard teaching methods without the animation media. Upon completion of all ten modules, both groups took the same post-test to measure post-learning

academic achievement. The scores from the experimental group were used to calculate the learning outcomes efficiency (E_2), and ANCOVA was used to compare academic achievement between the groups. Additionally, students in the experimental group completed a satisfaction questionnaire regarding the animation medium, and the data were analyzed to assess their satisfaction.

Data Analysis

The researchers analyzed the data using descriptive statistics, including the mean ($\bar{X}$), standard deviation (S.D.), and percentage (%), to describe learning achievement and student satisfaction. The efficiency values for the animation media were then calculated using the E_1/E_2 criteria and compared with the established standard. Furthermore, the researchers compared post-learning academic achievement between the experimental and control groups using Analysis of Covariance (ANCOVA) to control for pre-existing differences in baseline knowledge. The pre-test scores were designated as the covariate, and the post-test scores as the dependent variable. This analytical approach ensured that the comparison of academic achievement between the two groups was appropriate and clearly reflected the impact of the use of animation media. For data from the student satisfaction questionnaire regarding the animation media, the researchers analyzed it using means and standard deviations to summarize students' opinions on each aspect.

Ethical Considerations

This research received ethical approval from the Institutional Review Board (ALPS-IRB) of the Association of Legal & Political Studies under protocol number ALPS-IRB-2025-4-0003, dated May 1, 2025. All participants provided voluntary informed consent, and their data were kept confidential and used solely for academic purposes.

Results

Development of Animation Media for Enhancing Learning in Auditing and Assurance

The development of animation media to enhance learning in auditing and assurance courses followed the ADDIE Model. The production process was divided into three main stages: Pre-Production, which involved defining concepts, objectives, and designing storyboards; Production, which included creating graphics and animations using Adobe Illustrator, Adobe After Effects, and Adobe Premiere Pro; and Post-Production, which involved adding voice-overs, background music, and editing the final output into MP4 files. The developed animation media comprised 10 lessons, each averaging 5-6 minutes (as shown in Figure 2), covering the core content of auditing and assurance courses. Expert evaluation of the media's quality indicated that it was at the highest level (Mean = 4.83, S.D. = 0.08). This demonstrates that the developed animation media is highly appropriate in terms of content, instructional design, presentation, and student-level suitability, making it well-suited for teaching and learning.

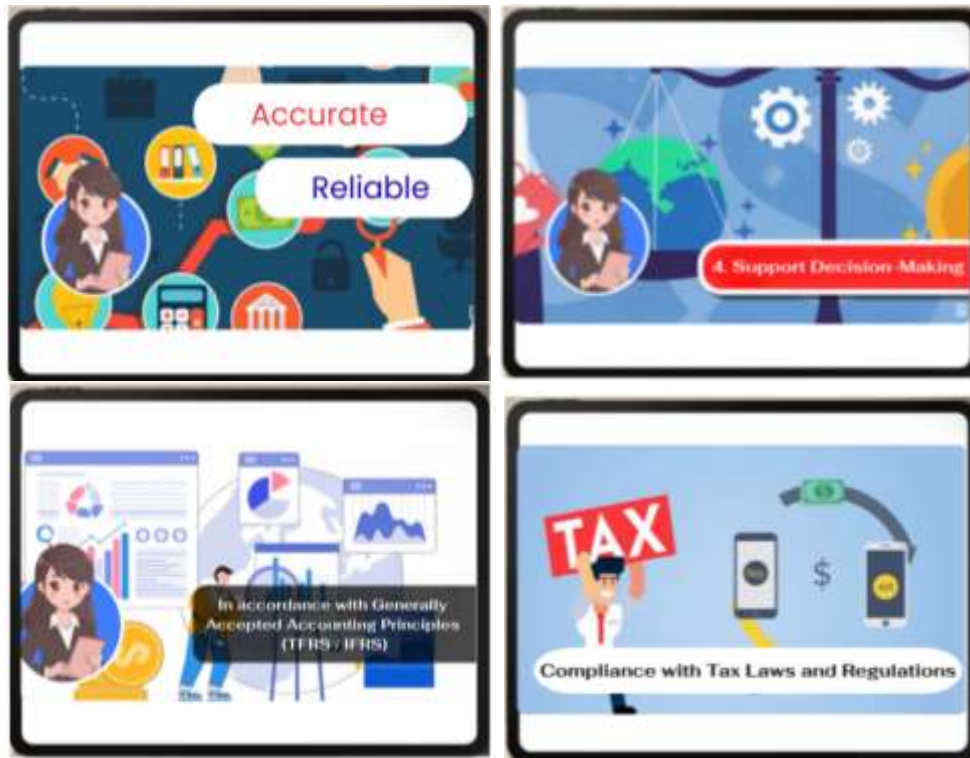


Figure 2 Examples of animation-based instructional media to enhance learning in the auditing and assurance course

Efficiency Evaluation of Animation Media for Enhancing Learning in Auditing and Assurance

The efficiency of animation media for enhancing learning in auditing and assurance courses was evaluated using learning achievement tests. These tests served as instruments to assess both the efficiency of the learning process (E_1) and the efficiency of learning outcomes (E_2) against the 80/80 standard. The same set of test questions was used, with question order and answer choices randomized to prevent memorization. The calculated efficiency values for the animation media were $E_1/E_2 = 84.90/88.30$ (as shown in Table 1), which exceeded the 80/80 standard for instructional media efficiency. This indicates that the developed animation media effectively support the learning process and help students achieve the learning outcomes specified in the curriculum, aligning with the Higher Education Qualification Standards Framework 2022.

Table 1 Results of the efficiency evaluation of the animation-based instructional media

Evaluation Phase	Full Score	Mean Score ($\bar{X}$)	Efficiency Percentage (%)	Efficiency Criterion ($E_1/E_2 \geq 80/80$)	Evaluation Result
In-process (E_1)	120	101.88	84.90	≥ 80	Passed the criterion
Post-learning (E_2)	120	105.96	88.30	≥ 80	Passed the criterion

Comparison of Academic Achievement between Experimental and Control Groups

An Analysis of Covariance (ANCOVA) was conducted to compare post-learning academic achievement between the experimental and control groups, controlling for pre-test scores as a covariate. The mean pre-test scores for the experimental group ($M = 39.73$, $SD = 2.33$) and the control group ($M = 39.43$, $SD = 1.96$) did not differ significantly, indicating comparable

baseline knowledge. After adjusting for the pre-test scores, the ANCOVA revealed a significant main effect of the instructional method on post-test scores, $F(1, 57) = 69.31$, $p < .001$. The experimental group demonstrated significantly higher academic achievement (Adjusted $M = 84.89$, $SE = 0.90$) compared to the control group (Adjusted $M = 74.27$, $SE = 0.90$). Furthermore, the effect size for the animation media intervention was very large (Partial $\eta^2 = 0.55$), indicating a substantial and statistically significant practical impact on students' academic achievement.

Table 2 Comparison of pretest and posttest scores between the experimental and control groups (ANCOVA)

Variable	Experimental Group (n = 30) Mean (SD)	Control Group (n = 30) Mean (SD)	Mean Difference	F	p-value
Pretest score	39.73 (2.33)	39.43 (1.96)	0.30	0.48	.489
Posttest score	84.89 (4.22)	74.27 (5.56)	10.62	69.31	< .001

Evaluation of Student Satisfaction with Animation Media for Enhancing Learning in Auditing and Assurance

The evaluation of student satisfaction with animation media for enhancing learning in auditing and assurance courses revealed that overall satisfaction was at its highest level (as shown in Table 3). When considering individual aspects, "content clarity" received the highest mean score, indicating that the developed animation media effectively helped students understand complex content more easily and visualize the auditing process systematically. Aspects related to "media appeal" and "motivation and learning engagement" also received similarly high mean scores, reflecting the media's ability to capture students' attention and stimulate sustained motivation for learning. While the "appropriateness of images and audio" aspect received the lowest mean score among all aspects, it was still at the highest level. The slight difference might stem from variations in individual preferences for specific color tones or background audio. Nevertheless, when all aspects are considered, the overall satisfaction level was very high, demonstrating that the developed animation media successfully met students' needs and effectively enhanced the learning experience.

Table 3 Results of the students' satisfaction evaluation toward the animation-based instructional media

Evaluation Dimension	Mean ($\bar{X}$)	SD	Level of Satisfaction
Content clarity	4.82	0.36	Highest
Media presentation	4.78	0.38	Highest
Appropriateness of images and audio	4.68	0.40	Highest
Ease of use	4.74	0.39	Highest
Motivation and learning engagement	4.76	0.38	Highest
Overall	4.76	0.38	Highest

Conclusion and Discussion

The development of animation media to enhance learning in auditing and assurance courses, following the ADDIE Model (Seels & Glasgow, 1997), demonstrated that the media was systematically created, encompassing all stages from analysis and design through development and implementation to evaluation. This research indicates that multimedia tools, specifically animation, significantly aid students in comprehending complex content. Ploetzner (2024) found that students with strong visuospatial working memory could better organize and sequence events and construct conceptual understanding from animations than those with weaker visuospatial working memory. Kleftodimos (2024) further concluded that educational

animation is most effective when designed to depict changes in objects, processes, or events across spatio-temporal dimensions; as such, dynamic characteristics help students build systematic mental models and clearly grasp logical relationships within the data. Moreover, animation designed according to cognitive principles helps reduce students' cognitive load, enabling them to process visual and temporal information more efficiently than relying solely on perceived content difficulty.

Regarding the media's efficiency evaluation, using pre- and post-tests as measurement tools, the E_1/E_2 values were 84.90/88.30. These values exceeded the 80/80 standard (Brahmawong, 2013), indicating that animation media not only facilitates student learning but also demonstrably improves academic achievement. Consequently, the research confirmed Hypothesis H1, which posited that the developed animation media would meet the 80/80 efficiency standard for instructional media (E_1/E_2). Furthermore, Hypothesis H2, stating that students learning with animation media would achieve significantly higher post-learning academic results than those taught with conventional methods, was also accepted. This finding aligns with Rashid et al.'s (2024) study on the impact of animated media on primary school students' learning processes, which reported higher levels of interest, retention, behavioral repetition, and learning motivation compared to traditional groups, resulting in significantly improved academic achievement. Similarly, Kogan et al. (2024) found that animation media and animated data visualization systems (AVDS) significantly enhanced academic achievement and student motivation.

The evaluation of student satisfaction indicated that overall satisfaction was highest across all aspects, thus supporting Hypothesis H3, which proposed that students learning with animation media would have a higher level of satisfaction. This outcome suggests that the developed animation media's positive impact on students was not limited to a single dimension but stemmed from an integrated design that seamlessly linked content, presentation, and usability. When students could clearly understand abstract content and complex audit processes, this generated positive feelings towards the media, increased interest in learning, and stimulated engagement in learning activities. These findings are consistent with Davis's (1989) model and DeLone & McLean's (2003) information system success model, which identifies user satisfaction as a key indicator of innovation success, influenced by perceived usefulness and perceived ease of use. This research also corroborates Maulidi et al.'s (2025) findings, which showed that three-dimensional animation media increased students' motivation, interest, and understanding across various disciplines, with most students reporting high satisfaction and improved comprehension of complex content. Similarly, Ningrum et al. (2024) reported that over 90% of students found their content comprehension enhanced, with motivation and enjoyment significantly increased and classroom participation rising by 85%, confirming that animation media helps students understand abstract concepts more concretely and creates highly engaging learning experiences.

In conclusion, this research demonstrates that animation media developed using the ADDIE Model can effectively promote learning in auditing and assurance courses, as evidenced by media quality, academic achievement, and student satisfaction. The findings underscore the suitability of using animation media in Asian education, particularly in professional disciplines like accounting, which often present challenges due to complex, process-oriented, and abstract content that requires conceptual understanding. This study contributes to the body of knowledge on the use of digital media for learning in the Asian context, illustrating how theory-driven animation media can bridge the gap between theoretical concepts and practical application. It can be adapted for other professional courses or educational institutions with similar contexts across Asia. From a sustainability perspective, this research supports sustainable development in education and human resource development, particularly by elevating learning quality and preparing students to become digital-era accounting

professionals. The use of animation as a learning aid promotes deep learning, reduces reliance on rote memorization, and supports the efficient, long-term use of learning resources, aligning with educational philosophies that emphasize equitable access to learning and effective use of technology. While this study primarily focuses on learning sustainability, future research could extend to linking learning outcomes with other dimensions of sustainability, such as long-term professional competency development or reducing the cost of educational resources at an organizational level.

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