Integrating Cloud Technology in Language Learning: Development of a Basic English Grammar E-Book

by Hariswan Putera Jaya

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Hariswan Putera Jaya[1], Novalingga Pitaloka[2], Hesty Wahyuni Anggraini[3]
[1]*Department of Language and Arts, Universitas Sriwijaya, Indonesia*
[2]*Department of Language and Arts, Universitas Sriwijaya, Indonesia*
[3]*Department of Language and Arts, Universitas Sriwijaya, Indonesia*

Corresponding Email: hariswan@unsri.ac.id

Abstract. This study aimed to investigate the development of a cloud-integrated e-book intended to enhance Basic English Grammar training for first-semester students in the English Education Program. A Research and Development (R&D) methodology employing the ADDIE model was utilized, which includes analysis, design, development, implementation, and evaluation. Data were collected using pre-test, post-test, interviews, and questionnaires. The results of the ADDIE stages indicated a notable enhancement in student performance compared to pre-test, with an average increase of 16.573 points (from M = 61.37 to M = 77.95) and a p-value of 0.000, substantiating the efficacy of the intervention. Furthermore, the survey reveal dissatisfaction with the lack of technological integration and engagement in existing materials, with 60% of students citing insufficient technology use and 65% noting limited engagement. The proposed e-book addresses these issues by utilizing cloud computing to incorporate interactive features and multimedia content. Strong support from 80% of students for technological integration, 75% for interactive activities, and 70% for multimedia content underscores the importance of these elements in enhancing the learning experience. The qualitative feedback revealed a significant demand for modern and interactive materials, highlighting the imperative to include technology into educational tools. The cloud-based e-book seeks to deliver accessible, engaging, and adaptable grammar instruction, facilitating ongoing updating and real-time collaboration. This unique technology solves the constraints of traditional teaching materials and supports consistent learning results, boosting students' understanding of English grammar and enhancing their overall educational experience.

Keywords: Cloud-integrated e-book, Basic English Grammar, Research and Development (R&D)

Introduction

The instruction of English grammar is a crucial component of language education (Kumayas & Lengkoan, 2023; Li, 2023), particularly for first-year students in English Education programs (Brøseth, 2023). Despite its acknowledged importance, conventional grammar teaching approaches frequently fail to meet the broad and evolving requirements of contemporary learners. Traditional methods, usually presented via lectures and textbooks, often lack the engagement required to cultivate profound comprehension and practical application of grammatical concepts (Larsari & Abouabdelkader, 2024). Imagine sitting through a monotonous lecture on the intricacies of subordinate clauses without any interactive elements or real-life applications to anchor these abstract ideas. As a result, numerous students face challenges in comprehending abstract grammatical principles and find it difficult to use them proficiently in practical communication. This disconnection not only impedes their verbal competence but also affects their overall academic and career advancement. For instance, a student who cannot effectively use complex sentence structures may struggle to express nuanced ideas in essays or professional settings. Moreover, the lack of accessible,

high-quality materials beyond the classroom exacerbates these difficulties. Students often find themselves without sufficient resources to independently practice and reinforce their comprehension of fundamental English grammar (Zigani, 2023), further widening the gap between theoretical knowledge and practical application.

To address these educational gaps, institutions have progressively integrated digital platforms and online learning resources into their curricula. Although these developments signify a substantial progression in the modernization of language training, they frequently remain disjointed and do not provide a unified and thorough learning experience (Li et al., 2024). Many current platforms fail to offer individualized, engaging learning experiences that cater to the varied requirements of individual students. Imagine a platform where a student can receive immediate feedback on their grammar exercises, participate in virtual study groups, and access multimedia content that brings grammatical concepts to life. The limited utilization of cloud-based technologies has hindered resource accessibility, resulting in learners encountering limitations concerning time, device compatibility, and geographical location. Such constraints can significantly impede students' capacity to study efficiently and independently (Alawbathani, 2024). The creation of a cloud-integrated e-book for the Basic English Grammar course presents a viable solution to these persistent issues. This e-book will offer students interactive grammar courses using cloud computing, accessible at any time and from any location. This cloud-based solution enables ongoing updates, real-time collaboration, and customized learning pathways tailored to the unique requirements of individual learners (Alshathri & Male, 2020). For instance, a student in a remote area can access the same high-quality resources as their peers in urban centers, leveling the educational playing field. Designed for first-semester students in the English Education Program, this resource aims to enhance student engagement, understanding, and application of grammatical ideas, fostering more effective and adaptable learning experiences.

This resource is specifically designed for first-semester students in the English Education Program, with the objective of improving student engagement, understanding, and application of grammatical ideas. By leveraging cloud technology, the e-book offers a more effective and adaptable learning experience (Maharani & Rahmawati, 2023). Students can follow personalized learning pathways that adjust to their individual progress and needs. For example, a student struggling with verb tenses can receive additional exercises and explanations tailored to their specific difficulties, while another student excelling in the same area can move on to more advanced topics without delay. This level of customization helps ensure that all students can progress at their own pace, fostering a more inclusive and supportive learning environment (Villarreal & Scott, 2024). Furthermore, the e-book's interactive features, such as multimedia content, make grammar lessons more engaging and enjoyable (Duklim & Hasan, 2024) . Instead of monotonous drills and rote memorization, students can engage with interactive quizzes, video lessons, and animated explanations that vividly illustrate grammatical concepts (Devi et.al, 2024). For instance, a lesson on conditionals might include a video scenario where students choose different outcomes based on different grammatical constructions, thereby seeing the immediate impact of their choices. This dynamic approach not only reinforces theoretical knowledge but also aids in the retention and practical application of grammatical rules (Jabbarpoor, 2023). By integrating these diverse elements, the cloud-integrated e-book not only improves students' grasp of grammatical concepts but also prepares them for real-world applications, ultimately contributing to their academic and professional success. This comprehensive approach transforms grammar education from a static and often daunting task into an engaging and adaptive learning journey.

Theoretical Framework
The Importance of Teaching English Grammar

Teaching Instructing English grammar is fundamental to language education, particularly for first-year students in English Education programs. Effective grammar education is essential for students, providing them with the linguistic abilities required for academic

success (Bodine-Landis, 2023). Proficiency in grammar is not solely an academic requirement; it is vital for successful communication, analytical reasoning, and the comprehensive enhancement of linguistic skills. This essential information is crucial for prospective instructors, who must demonstrate proficient language usage to their students (Hollie, 2017).

Furthermore, mastery of grammar is strongly associated with the development of higher language competencies (Kieseier et al., 2022), such as reading comprehension, coherent writing, and oral communication. For students in English Education programs, the ability to formulate grammatically correct sentences is essential for effectively and convincingly expressing their views. Challenges in comprehending grammatical notions might hinder students' participation in academic discourse, resulting in difficulties in their studies and future professional contacts (Myhill, 2018). A comprehensive grammar program is vital as it enhances linguistic skills and reinforces students' confidence in their communicative talents.

Moreover, the ramifications of grammar teaching transcend academic success. The adept application of grammar is crucial for personal and professional growth, influencing students' capacity to manage diverse communication contexts (Pangket, 2019). In a progressively interconnected global landscape, where efficient communication is essential for collaboration and success, robust grammatical abilities have become increasingly imperative. Therefore, educational programs must emphasize grammar instruction to adequately equip students for the diverse obstacles they will confront in their future occupations (Santos, 2018).

The Limitations of Traditional Instruction Methods

Although the significance of grammar in language education is acknowledged, conventional teaching approaches often do not effectively interest pupils. Traditional methods, predominantly dependent on lecture-based instruction and textbooks, frequently cultivate passive learning environments (Dietrich & Evans, 2022). The absence of engagement may lead to a cursory comprehension and retention of grammatical principles, rendering pupils inadequately equipped to utilize their knowledge in practical situations. The disparity between theoretical grammatical norms and their practical implementation poses considerable difficulties for students attempting to employ grammar successfully in communication (Aziz & Kashinathan, 2021).

This disconnection not only impedes language development but also adversely impacts students' overall academic experiences. A multitude of students articulate irritation and reduced motivation when they struggle to comprehend and implement grammatical norms, subsequently affecting their overall academic performance (Aziz & Kashinathan, 2021). The inability to comprehend grammatical intricacies may result in diminished academic performance and decreased self-esteem, so perpetuating a circle of educational challenges. Moreover, the deficiency of high-quality educational resources beyond the classroom intensifies these challenges, as students frequently lack essential tools for autonomous practice and consolidation of their comprehension.

Moreover, the constraints of conventional grammar teaching approaches mirror wider socioeconomic trends in schooling. As student needs evolve in the digital age, educational institutions must modify their teaching approaches to correspond with these changes (Bonfield et al., 2020). The conventional educational paradigm, centered on rote memorization and passive learning, is becoming regarded as insufficient for preparing students with the competencies necessary to navigate the intricacies of contemporary communication (Rajaram & Rajaram, 2020). This situation highlights the pressing necessity for novel teaching methods that foster engagement, critical thinking, and autonomous learning, enabling students to develop a deeper comprehension of English language.

The Integration of Digital Platforms in Language Education

Due to the constraints of conventional teaching methods, numerous educational institutions have started to investigate the use of digital platforms and online learning tools to enhance language instruction. These technology innovations offer multiple chances to improve student engagement and cater to varied learning preferences. Nonetheless,

numerous current systems experience fragmentation, resulting in disparities in instructional quality and overall learner experiences. Although these digital tools can be helpful additional resources, they often lack the ability to deliver a unified and comprehensive learning experience that adequately meets the needs of individual students (Suskie, 2018).

A major issue with several digital learning platforms is their deficiency in personalization and engagement. Numerous current resources lack adaptive learning paths and real-time feedback mechanisms, thus undermining student motivation and engagement (Gligorea, 2023). Students may feel disengaged or overwhelmed by the material when they do not experience personalized learning geared to their own requirements and learning styles. Furthermore, the restricted adoption of cloud-based technology intensifies these issues, as students frequently encounter obstacles pertaining to time limitations, device compatibility, and geographical constraints. Such shortcomings can significantly impede their capacity to connect with grammar content effectively and autonomously.

Notwithstanding these limitations, the prospective advantages of incorporating digital platforms into language instruction are significant (Bailey & Lee, 2020). When utilized successfully, these technologies can offer access to a wide range of instructional resources, promoting a more engaging and participatory educational atmosphere. Moreover, utilizing multimedia resources—such as movies, podcasts, and interactive quizzes—can augment students' comprehension of grammatical principles by providing diverse representations of the content. The difficulty is to ensure that these digital tools are meticulously created and incorporated into the curriculum, providing a cohesive and enjoyable learning experience that addresses the varied needs of students (Dean & Lima, 2022).

The Cloud-Integrated Educational Resources as a Solution

In light of the difficulties presented by conventional methods and disjointed digital resources, the creation of cloud-integrated educational tools presents a viable option. Employing cloud computing can improve educational methodologies by enabling real-time collaboration, ongoing updates, and personalized learning trajectories (Wang & Wang, 2023). Utilizing cloud technology enables educational resources to be more dynamic and responsive to students' need. Students can access interactive grammar classes at any time and from any location, enabling them to engage with the content at their own speed and according to their personal learning preferences.

The suggested cloud-based e-book for the Basic English Grammar course offers a novel solution designed exclusively for first-semester students in the English Education program. This website seeks to provide engaging and interactive grammar courses with many multimedia components, such as movies, quizzes, and collaborative activities. These characteristics aim to improve student engagement and understanding, allowing learners to effectively apply their knowledge in practical situations. The cloud-based system facilitates ongoing upgrades and real-time cooperation, guaranteeing that students access the most up-to-date resources and learning materials (Alam, 2022).

Material and Method
Research Procedures

This study adopted a research and development (R&D) approach, aimed at designing and assessing the effectiveness of an e-book for the Basic English Grammar course. The ADDIE model offers a structured process for developing products that are both effective, practical, and meet quality standards (Almelhi, 2021). The methodology was structured into key phases as follows:

Table 1.
ADDIE Frameworks

ADDIE Frameworks	Research Stages
Analysis	In the analysis phase, we begin by identifying the specific needs of first-semester English Education students concerning Basic English Grammar. This involves conducting

	surveys, interviews, and assessments to understand their current proficiency levels, common challenges, and learning preferences.
Design	During the design phase, we structure the e-book to include cloud-based features that align with the existing curriculum. This involves outlining the content, selecting appropriate multimedia elements, and determining the flow of the interactive activities. The design process includes mapping out how each topic will be covered, such as breaking down grammar lessons into manageable sections, incorporating quizzes for self-assessment, and using videos for illustrative explanations
Development	The development phase is where the actual creation of the e-book takes place. This involves developing interactive multimedia content and collaborative activities using cloud computing tools.
Implementation	In the implementation phase, the e-book is deployed in three stages: one-to-one, small group, and a real classroom setting. Initially, we test the e-book with individual students to gather initial feedback and make necessary adjustments. Once the initial testing is complete, we expand to small groups to observe interactions and gather more comprehensive feedback. Finally, we implement the e-book in a real classroom environment to assess its effectiveness in a larger, more diverse setting
Evaluation	The evaluation phase involves assessing the e-book's effectiveness through tests, questionnaires, and user feedback. We use pre- and post-tests to measure students' improvement in grammar skills, as well as surveys and questionnaires to gather their perceptions of the e-book's usability and engagement

Data Collections and Analysis

Pre- and Post-Tests: To gauge the progress of the students, pre-tests were administered before the introduction of the e-book, and post-tests were conducted after a set period of using the e-book. These tests were meticulously designed to measure various aspects of grammar proficiency, including sentence structure, verb usage, and punctuation. By comparing the scores from the pre- and post-tests, we were able to quantify the improvement in students' grammar skills.

Questionnaires: To gather detailed feedback on the usability and engagement of the e-book, questionnaires were distributed to both students and teachers. The questionnaires included a range of questions designed to assess different aspects of the e-book, such as its ease of use, the clarity of explanations, the interactive features, and overall satisfaction.

Interviews: To gain deeper insights into the e-book's overall effectiveness, the interviews were conducted with both students and teachers. These interviews allowed participants to share their experiences, thoughts, and suggestions in a more detailed and personal manner.

Quantitative Analysis: The quantitative data from the pre- and post-tests were analyzed using paired t-tests, a statistical method used to compare the means of two related groups. This analysis helped determine whether the changes in test scores were statistically significant, providing concrete evidence of the e-book's effectiveness in improving grammar skills.

Qualitative Analysis: The qualitative data gathered from questionnaires, interviews, and observations were analyzed to identify patterns and themes related to student engagement and the overall effectiveness of the e-book. This involved coding the responses and

categorizing them into key themes, such as user experience, engagement, and learning outcomes.

Results and Discussion

Results

The paired samples t-test results indicate a significant enhancement in participants' scores from the pretest (M = 61.37) to the posttest (M = 77.95), with a mean difference of 16.573 points. This augmentation signifies the intervention's beneficial effect on performance. The t-value of -13.217, with 74 degrees of freedom and a p-value of 0.000, indicates that the difference is statistically significant, suggesting that the improvement is improbable to be attributable to chance. The 95% confidence interval for the mean difference (-19.072 to -14.075) and the low standard error of 1.254 further substantiate the dependability of the data. The decrease in variability from the pretest to posttest indicates that the intervention enhanced overall performance and produced a uniform effect among participants. The results demonstrate that the intervention effectively improved participants' test scores significantly.

Table 2.
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PretestScores	61,37	75	12,622	1,457
	PosttestScores	77,95	75	9,419	1,088

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	PretestScores - PosttestScores	-16,573	10,859	1,254	-19,072	-14,075	-13,217	74	,000

Forty percent of participants evaluate the current resources as "Fair," signifying considerable potential for enhancement. Merely 10% consider them "Excellent." The majority of participants perceive the existing instructional materials as "Fair," suggesting that although they fulfill fundamental requirements, significant enhancements are necessary. This evaluation indicates that the materials, while functional, may lack sufficient depth, relevance, or contemporary appeal to fully engage students or effectively facilitate learning, highlighting the necessity of rectifying these shortcomings to enhance the overall quality and efficacy of the educational resources.
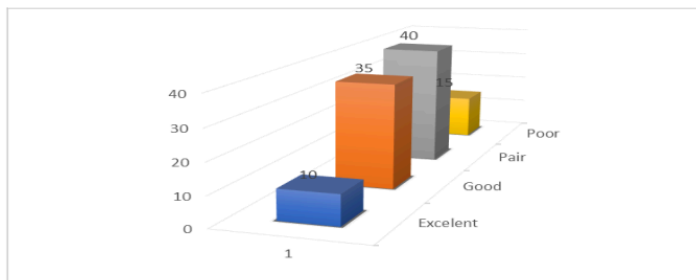

Figure 1.
Rating of Current Teaching Materials

Textbooks constitute the predominant resource utilized (80%), succeeded by online materials (60%). Interactive software is utilized less frequently (30%), indicating a potential for enhanced integration.
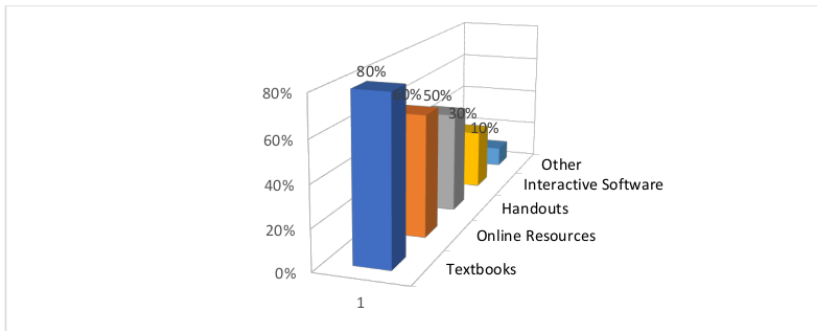

Figure 2.
Types of Materials Currently Used

The predominant difficulties identified are inconsistency (70%) and outdated content (55%). The absence of technological integration (60%) and insufficient participation (65%) are notable issues. The primary concerns of the existing instructional resources encompass inconsistency, characterized by variable content and structure, resulting in confusion and disparate learning experiences. Furthermore, a significant portion of the content is obsolete, not aligning with contemporary knowledge or practices, so undermining its relevance and efficacy. Moreover, there is insufficient integration of technology, indicating that the materials do not fully utilize contemporary technologies and digital resources that could augment learning through interactive and multimedia components. These difficulties cumulatively impede the overall quality and engagement of the instructional materials.
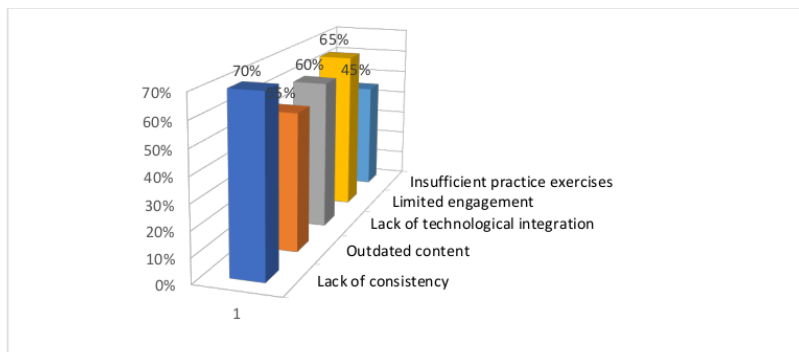

Figure 3.
Main Issues with Current Materials

An overwhelming majority (80%) agree that integrating technology into the materials would enhance the learning process. There is robust advocacy for augmenting technological integration in educational materials, specifically focusing on the inclusion of interactive exercises and multimedia information. Participants assert that utilizing these digital tools can

significantly enhance the learning experience by rendering it more interesting and lively. The integration of technology is regarded as an essential measure for modernizing materials, offering students more interactive and visually engaging tools that accommodate various learning styles and enhance overall understanding.
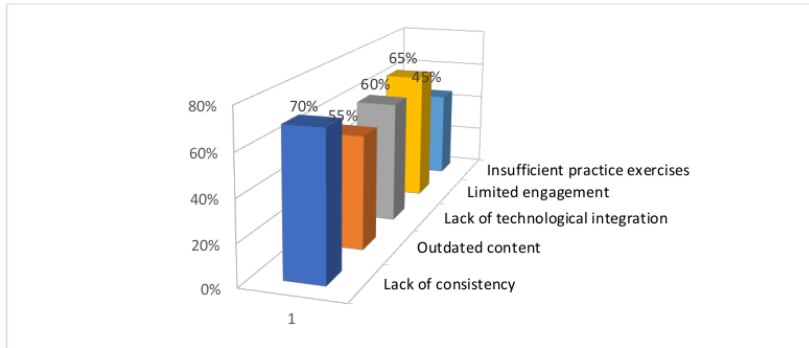

Figure 4.
Support for Technological Integration

The most sought-after technology attributes are interactive activities (75%) and multimedia content (70%). The most desired technology improvements in educational materials include interactive exercises, selected by 75% of respondents, and multimedia content, recommended by 70%. These elements are esteemed for their ability to provide dynamic and engaging methods to enhance learning, accommodate diverse learning styles, and simplify complicated topics. The robust demand for these tools signifies a distinct inclination towards a more interactive and visually enhanced educational experience, highlighting a substantial opportunity to update the materials and improve student learning assistance.
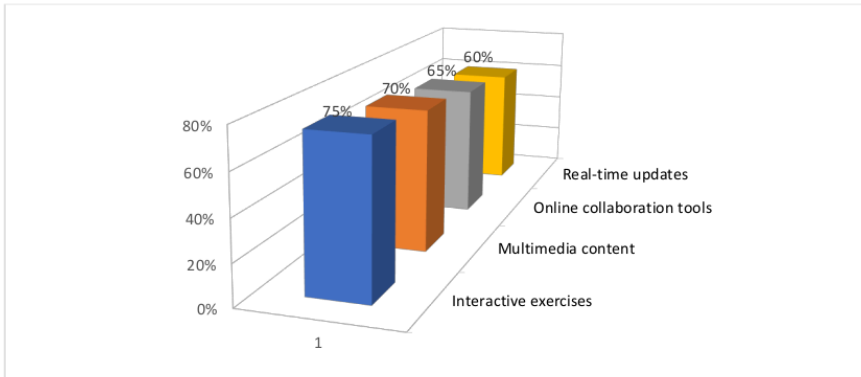

Figure 5.
Desired Technological Features

Participants recommend content updates (65%) and enhanced utilization of interactive and multimedia components (70%) as primary enhancements. The primary objectives for

enhancing the teaching materials include updating the content to maintain its currency and relevance, augmenting technological features for improved integration of digital tools and interactive elements, and increasing overall engagement to render the learning experience more compelling for students. These enhancements seek to develop resources that are both informative and more congruent with contemporary educational methodologies, thereby more effectively addressing the requirements of instructors and learners in a progressively digital learning landscape.
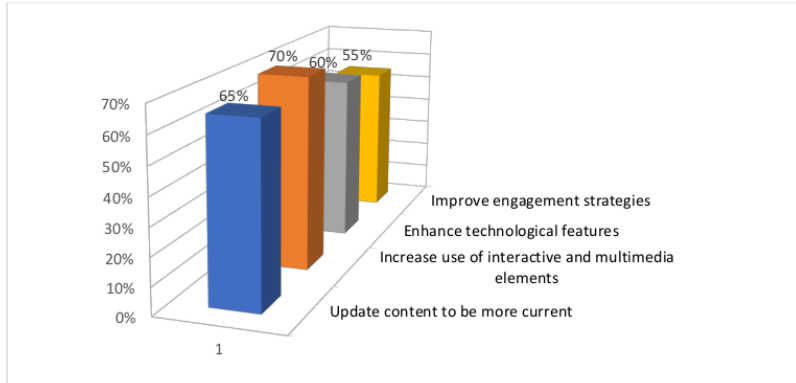

Figure 6.
Suggested Improvements

The results of the paired samples t-test provide strong evidence of the intervention's effectiveness, signifying a statistically significant improvement in student performance. The increase in the mean score from 61.37 in the pretest to 77.95 in the posttest, indicating a substantial gain of 16.573 points, illustrates that the intervention significantly impacted students' understanding of the subject, particularly in Basic English Grammar. The p-value of 0.000, far below the conventional threshold of 0.05, highlights the statistical significance of this improvement, suggesting that the observed change is unlikely to have occurred by chance. The intervention, whether by innovative teaching methods, revised instructional materials, or technological improvements, evidently improved students' aptitude in the subject. The considerable t-value (-13.217) substantiates the claim that the intervention produced a significant and marked alteration between pretest and posttest scores. The tight confidence interval (-19.072 to -14.075) indicates the data's precision, implying that the true mean difference between the pre- and post-intervention scores is likely within this range. This heightened confidence supports the assertion that the intervention was effective and consistently produced significant learning outcomes.

Discussions

These findings are especially relevant to the creation of a Basic English Grammar E-book integrated with cloud computing for the student. The decrease in standard deviation from 12.622 in the pretest to 9.419 in the posttest signifies that the intervention had a uniform effect on students across all ability levels. This is crucial for educational materials like the suggested e-book, since it highlights the ability of such tools to improve overall performance and reduce learning disparities. The incorporation of cloud computing into the e-book would offer pupils perpetual, updated, and interactive grammar lessons tailored to their learning needs and accessible at all times (Ibadango et al., 2019; Alexeeva & Buriakova, 2021; Dwivedi et.al, 2023). The technology-driven approach ensures that all students, regardless of their initial skill level, may access customized learning experiences and collaborative tools that promote ongoing engagement and understanding (Kayyali, 2024). The reduction in variability suggests

that this teaching approach is inclusive, promoting good grammar skill development for a broader range of learners. Thus, developing the e-book on a cloud-based platform is likely to have similar advantageous outcomes, aiding students in achieving more consistent and improved competency in English grammar (Tomei, 2024; Chen, Zou & Xie, 2024).

The analysis of the educational materials highlights the necessity for modern, updated, and technology-integrated resources. The majority of participants evaluated their current teaching resources as "Fair," signifying a lack of quality and relevance—issues that the proposed e-book intends to address. The integration of cloud computing allows the e-book to consistently provide updated resources that conform to contemporary educational norms, accessible to students at any time and from any location (Kumar et al., 2021; Evenddy, Gailea & Syafrizal, 2024). Cloud computing provides instant access to educational resources, cooperation, and updates, thereby mitigating students' worries regarding outdated content (Dwivedi et al., 2021). Cloud technology enables the e-book to function as a dynamic text, easily updated with new grammar rules, examples, or pedagogical methods, so maintaining its relevance and effectiveness over time (Peele, Stoll & Stella, 2018).

The survey revealed dissatisfaction with the lack of technological integration and engagement in current materials. Sixty percent of students indicate insufficient technology utilization, while sixty-five percent acknowledge limited engagement as a concern, highlighting the need for interactive features in the e-book. Cloud computing furnishes the requisite infrastructure to execute these functionalities effectively (Chowdhury et al., 2020). The e-book may incorporate interactive exercises that adapt to students' progress and needs, provide multimedia content that elucidates complex grammar concepts in accessible ways, and include collaborative capabilities for peer-to-peer or instructor-student interaction (Value, 2022). These aspects respond to the acknowledged need for enhanced engagement and active learning, ensuring that the resource is not just informational but also dynamic and student-focused.

The strong support for technological integration, with 80% of students in favor, highlights the importance of utilizing cloud computing in the development of the e-book. Cloud technology enables the incorporation of interactive activities, favored by 75% of participants, and multimedia content, recommended by 70%. These capabilities can be seamlessly included into the e-book, augmenting the interaction and aesthetic appeal of grammar training. Cloud-based solutions allow students to preserve their progress, access tailored learning resources, and participate in discussions or real-time collaboration (Lata & Sharma, 2024; Dwivedi et al., 2023). This level of integration improves learning efficiency and modernizes the educational experience, matching it with students' digital competencies and preferences.

The participants' suggestions for improvements—updating content and increasing the utilization of interactive and multimedia elements—align well with the objectives of the proposed e-book. Through regular content updates via cloud computing, the e-book can offer modern, relevant, and comprehensive grammar instruction. Concurrently, interactive features and multimedia elements promptly fulfill the demand for a more stimulating and supportive educational environment. The integration of cloud computing enables real-time updates, enhances accessibility, and permits the e-book to adjust to students' learning needs, while also providing educators the ability to alter materials based on student progress and feedback (Das, 2024; Voronkova, 2023). This creates a modern educational tool that significantly enhances understanding and mastery of English grammar.

The research findings underscore the imperative of developing a cloud-integrated e-book for Basic English Grammar. The improvement in test scores, together with feedback on current educational materials, highlights the need for modern, engaging, and technology-integrated tools. The proposed e-book fulfills these criteria by incorporating cloud computing alongside interactive and multimedia elements, thereby offering a modern, accessible, and effective educational resource for first-semester students in the English Education Program.This e-book can significantly enhance student interest, performance, and long-term comprehension of English grammar by addressing the deficiencies identified in this research.

Conclusion

The results of research suggest that the use of cloud-based technology into educational materials, such as an e-book for Basic English Grammar, markedly improves student performance and engagement. Participants demonstrated a significant enhancement in test scores, rising from 61.37 to 77.95 points, so validating the efficacy of the intervention. Although basic needs are met, existing resources are assessed as "Fair," highlighting significant concerns such as obsolete information, inadequate technology integration, and limited interactivity. The majority of participants demonstrated a pronounced preference for materials that integrate interactive exercises, multimedia components, and frequent updates. The suggested cloud-integrated e-book mitigates these issues by offering accessible, current, and interactive grammar training, so ensuring that educational resources remain pertinent and captivating for learners. This contemporary approach corresponds with current educational approaches and addresses the changing requirements of both students and educators in a progressively digital learning landscape.

Acknowledgement

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