
Innovative development of smart book: Text written English Grammar for English education department students

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Abstract

The text written English grammar is a developed course within the latest outcome-based education curriculum in the English Education Department, previously referred to as Grammar course. The change in nomenclature signifies a shift in instructional focus. At the same time, the Grammar course generally provides all the rules and structures; the Text Written English Grammar course concentrates specifically on the grammatical rules applied in written contexts, highlighting the use of more precise and more complex sentence structures. The urgency of this research stems from the lack of teaching materials for the Text Written English Grammar course, as well as the challenges in accessing suitable resources for this subject. The research aimed to demonstrate the development of the Text Written English Grammar smart book and to assess the feasibility of this smart book, which is currently under development.” The research employed the research and development method, which includes four main stages: analysis, design, development, implementation, and evaluation.

Keywords

Innovative development, smart book, Text Written English Grammar

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Introduction

This research was conducted to support the goals of the latest curriculum development in the English Education Study Program. One manifestation of this development is the renaming of specific courses, which consequently expands their learning objectives. For example, the course formerly known as “grammar” is now called “Text Written English Grammar.” This change in nomenclature signifies a shift in instructional focus. While the earlier Grammar course emphasized general rules and structures of the English language, the Text Written English Grammar course specifically addresses grammatical rules for written contexts, highlighting the use of more precise and complex sentence structures. The goal is for students to use correct grammar in their writing.

The difficulty in finding appropriate learning materials for this course has become a significant obstacle to achieving an effective learning process, as learning materials play a crucial role in the success of teaching and learning activities. To tackle this problem, the researchers plan to create teaching materials by combining a smart book with technology. The instructional materials will also be tailored to the needs of students, lecturers, and the curriculum. According to [Sudrajat et al. \(2022\)](#), technology has been evolving rapidly to meet human needs, and such technological advancements can provide significant benefits if appropriately managed ([Afifuddin, 2017](#)). The teaching and learning process is an interaction between students, educators, and learning resources within a learning environment ([Ilyashenko et al., 2019](#)). This statement suggests that educators have a responsibility to create a conducive learning environment through interaction with students, thereby achieving the intended learning objectives. To establish an effective learning environment, both educators and students require access to media and materials that support them in achieving their learning goals. [Komariah and Halimah \(2022\)](#) found that books are one of the learning resources that can serve as both instructional media and sources of knowledge. The books contain systematically organized information or content designed to facilitate students' learning and help them achieve the intended learning objectives and competencies. [Waraulia \(2020\)](#) asserted that these teaching and learning resources can be effectively utilized.

Due to the essential nature of books as learning sources, the innovative development of the Text Written English Grammar smart book is necessary, as this course produces English texts with accurate grammar, enabling students to explore and express their ideas effectively in writing. Grammar knowledge and writing skills are two inseparable components of effective writing. Several studies have indicated that integrating technology into the learning process can enhance instructional quality and deepen students' knowledge ([Hambali et al., 2023](#); [Yilmaz, 2021](#)). Moreover, studies have shown that integrating technology in education fosters students' creative thinking skills ([Fahmi et al., 2021](#); [Yilmaz, 2021](#)).

The absence of primary teaching material for the Text Written English Grammar course emphasizes the urgency of this research. Furthermore, observational data indicate that grammar- and writing-related courses are often perceived as monotonous and unengaging by students, even though this course integrates both aspects. Considering that many learners prefer printed books over e-books, the researcher aims to develop a printed smart book that integrates technology through QR codes, allowing readers to connect directly to online content

using their smartphones. This feature is expected to provide students with a new and interactive learning experience, thereby making the learning process of Text Written English Grammar more effective and engaging. The primary advantage of the problem-solving approach in this research lies in the development of a smart book, where the researcher aims to create instructional materials that integrate technology using QR codes. Students can scan these codes to access various engaging learning resources, including instructional videos and interactive writing exercises equipped with features tailored to learners' needs.

The researcher had previously developed a smart digital book for a different course. That version of the digital book utilized hyperlinks solely as the digital assessment tool at the end of each learning session. Although several studies have previously focused on the development of instructional materials for grammar-related courses, no research has specifically developed a smart book on Text Written English Grammar that concentrates on the application of grammar in writing. Moreover, the development of smart books in English language education remains very limited. The novelty of this research lies in the development of the Text Written English Grammar smart book, which integrates technology into instructional materials. While previous studies have utilized modern technologies as teaching aids for grammar instruction, they have primarily focused on information system programs and grammar applications, such as Natural Language Processing (NLP) tools designed to check grammar accuracy and provide suggestions for vocabulary usage, thereby improving learners' understanding. However, the development of smart books specifically for grammar instruction remains rare, with most existing research focusing on other fields such as science and elementary education (Hardiansyah et al., 2023).

This research seeks to introduce a new approach by integrating applications and smart books as instructional materials for the Text Written English Grammar course. It is expected to make a significant contribution to the English Education Department by enhancing the effectiveness of the teaching and learning process. Furthermore, this innovation aims to provide students with new and engaging learning experiences throughout their studies. In previous research, the researcher conducted a research and development project on a Smart Digital Book for the Teaching and Learning course (Habibah & Oktavia, 2022), designed to meet the needs of both students and lecturers. The Smart Digital Book, developed with the integration of technology, made a significant contribution to the effectiveness of classroom learning. In the same year, the researcher also carried out a community service program by providing training on the development of technology-based instructional media.

Methodology

Research design

This current research was conducted using a research and development (R&D) design. Research and development is a methodological approach used to design and develop a specific product and to validate its usage (Hardiansyah et al., 2023). The product to be developed in this research is a smart book, which will serve as the primary source for students in the English Education Study Program, particularly in the Text Written English Grammar class. This research adopted an R&D approach following the ADDIE model, which serves as a

systematic framework for the analysis, design, development, implementation, and evaluation of instructional materials.

The first step was analysis. In this stage, the researchers conducted a comprehensive analysis of the needs and challenges encountered in the Text Written English Grammar class. Moreover, the researchers also analyzed the existing curriculum used in the English Education program to gather more information. Conducting this needs analysis helped identify the instructional gaps, learning objectives, and competencies required to design effective learning materials. Based on the findings from the analysis stage, the researcher proceeds with a detailed planning phase. The primary activity in this stage involves designing the structure and content framework of the smart book in alignment with the identified needs and curricular objectives. Following that, the development phase involved preparing and creating instructional materials for the Text Written English Grammar smart book. Once the overall framework and structure of the book are established, the next step involves creating the final version of the product, incorporating appropriate content, features, and pedagogical elements.

The next step was to implement the smart book that had been designed and developed. This stage involved testing the product in two phases. Initially, a small-scale trial is conducted with a group of 10 students to gather preliminary feedback and identify potential areas for improvement. Following this, a large-scale implementation is carried out, involving 40 students from the English Language Education program, to evaluate the effectiveness of the smart book in a broader instructional context. In the final stage, media and material evaluation and feedback collection were conducted to assess the quality, usability, and pedagogical effectiveness of the developed smart book. Each stage of the research and development process is interrelated and cyclical, ensuring continuous refinement and improvement of the product throughout its development. Two experts were involved in this stage as the media validator and the material validator. The evaluation or validation was conducted using the validation questionnaires.

Data collection and analysis

The data collection in this research was conducted using four main instruments: a material expert validation sheet, a media expert validation sheet, a questionnaire, and an observation sheet. The experts validated those instruments before they were distributed to the validator. Thereafter, the material and media validation questionnaire was distributed to the material expert and media expert to evaluate the content quality and the appropriateness of the developed learning media. To gather more data, questionnaires were also distributed to students and lecturers of the Text Written English Grammar course to collect data related to needs analysis in the learning process.

Additionally, observation sheets were used to collect data during the implementation and trial phases of the Text Written English Grammar instructional materials, which were developed as the product. This triangulation of instruments ensured the reliability and validity of the data collected throughout the research process.

Meanwhile, data analysis was conducted using descriptive statistical methods to calculate the mean percentage scores of the research instruments. This approach enables a systematic interpretation of the collected data, providing a clear overview of the findings. Furthermore,

the validation of the instructional media was assessed based on specific evaluation criteria, which serve as the standard for determining the quality, feasibility, and effectiveness of the developed product. The assessment criteria are outlined as follows:

Table 1. *Interval of media expert validation (Habibah et al., 2023)*

Intervals	Categories
0-20	Very invalid
21-40	Invalid
41-60	Quite valid
61-80	Valid
81-100	Very Valid

Findings

The presentation of the findings is systematic and aligns with the research's purpose. Sufficient and relevant quotations, examples, tables, and diagrams support the findings. The primary objective of this research is to develop smart book learning materials for the Text Written English Grammar course. This research employs a research and development (R&D) approach utilizing the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Ridwan, 2017). The research was executed in accordance with each phase of the model, and the findings are delineated as follows:

Analysis

The analysis phase of this research was divided into three main components: curriculum needs analysis, lecturer needs analysis, and student needs analysis.

Curriculum needs analysis

The curriculum requirements for the Text Written English Grammar course were identified through an in-depth review of the English Education Department's curriculum documents at Universitas Muhammadiyah Muara Bungo. A curriculum is defined as a structured set of plans and arrangements regarding objectives, content, learning materials, and methods of implementing teaching and learning activities, which serves as a guideline for the English Education Department to achieve the Program Learning Outcomes (PLO).

The renaming of the Grammar course to Text Written English Grammar represents a significant curriculum development initiative within the English Education Department. Formerly known as Grammar 3, the course now has a broader and more specific objective: rather than solely teaching English grammatical rules, it emphasizes students' ability to compose written texts that adhere to correct English grammar conventions. Based on the analysis of the Outcome-Based Education (OBE) curriculum documents, the Text Written English Grammar course is designed to provide students with knowledge of grammar and writing mechanics. It also provides students with writing styles and how to use English correctly in all of their writing. The topics include the application of basic grammar and

mechanics, the use of rules of standard English usage, and the application of vocabulary from a prescribed program.

Furthermore, this course focuses on achieving six Program Learning Outcomes (PLOs): PLO 1, PLO 2, PLO 3, PLO 5, PLO 6, and PLO 7 (Muzakir & Susanto, 2023). Those program learning outcomes can be displayed in the following table.

Table 2. *PLO and the description*

Program Learning Outcomes	Description
PLO 1	Students are expected to become individuals who are devout and God-fearing, uphold Muhammadiyah values, and demonstrate moral integrity, ethical conduct, and a strong sense of nationalism. Through a learning process that respects religious and cultural diversity, they should develop responsibility, sincerity, and commitment within their field of expertise. (<i>Attitude</i>)
PLO 2	Students can make accurate and well-considered decisions in addressing problems within their professional domain, based on a comprehensive analysis of information and data. (<i>General Skills</i>)
PLO 3	Students possess a comprehensive understanding of concepts, structures, content, and scientific paradigms in the field of English language studies, which are essential for designing and delivering compelling learning experiences as professional educators. (<i>Specific Knowledge</i>)
PLO 5	Students can apply linguistic concepts effectively in the contexts of industry, business, and education, demonstrating their ability to transfer academic knowledge into practical professional settings. (<i>Specific Knowledge</i>)
PLO 6	Students demonstrate mastery of theoretical linguistic concepts and can apply oral and written communication techniques in general English for daily, academic, and professional contexts, equivalent to the post-intermediate level. (<i>Specific Knowledge</i>)
PLO 7	Students demonstrate mastery of theoretical linguistic concepts and can apply oral and written communication techniques in English for Specific Purposes (ESP) across everyday, academic, and professional contexts, equivalent to the intermediate level. (<i>Specific Knowledge</i>)

The Text Written English Grammar course is classified under study area 1, namely Linguistic Elements. This course is compulsory and offered in the third semester. It carries a total of 2 credit units, comprising one credit for theoretical instruction and one credit for practical application. Based on the documented Course Learning Outcomes (CLOs) outlined in the official course syllabus or semester learning plan, this course is designed to achieve three specific learning outcomes as follows:

- CLO 1: Students can comprehend and critically evaluate the basic ideas of written English grammar.
- CLO 2: Students can use English grammar rules correctly when writing, both in academic and non-academic contexts.

- CLO 3: Students can conduct grammatical error analysis in written texts and revise them systematically, demonstrating a critical, meticulous, and responsible attitude throughout the revision process.

Lecturers need analysis

The analysis was also conducted to determine the specific needs of the lecturers of this course. Based on interviews with the course instructor, the lecturers' needs can be categorized into two areas: academic needs and pedagogical needs.

Academic needs, a well-structured course syllabus, which includes the program learning outcomes (PLOs), course learning outcomes (CLOs), sub-CLOs, assessment strategies, and teaching methods, is a fundamental prerequisite for lecturers before teaching the course. In this course, the lecturer already possesses a defined syllabus. However, the assessment components for each meeting, which are crucial for reflecting on and evaluating the achievement of learning indicators, have not yet been systematically organized.

Moreover, the lecturer lacks comprehensive teaching material, such as a module or a textbook. As a result, they face difficulties in collecting and organizing various fragmented learning resources. The lecturer pointed out that students require well-structured, consolidated teaching materials that closely align with the course plan. Another significant challenge is the lack of updated references specifically related to the application of English grammatical rules in writing.

The lecturer also reported the absence of interactive learning components, which students highly desire. Limited knowledge and skills in using technology make it even harder to add these parts to the course. Moreover, the lecturer lacks access to a sufficient and reliable set of exercises or test items. Existing materials sourced from various references are often inadequate, and the advancement of technology allows students to detect the sources of questions, making them less effective for assessment. Consequently, the lecturer needs more challenging, AI-assisted question banks that can support meaningful evaluation.

Pedagogical needs

Within an Outcome-Based Education (OBE) framework, lecturers are expected to implement a student-centered learning approach, specifically Student Active Learning (SAL). In this regard, the lecturer aims to integrate several active learning strategies, including Discovery Learning (where students identify grammatical rules from authentic texts), Problem-Based Learning (where students analyze and correct the common errors in the texts, and Collaborative Writing (where the students engage in peer review and group writing activities). Developing systematically structured teaching materials tailored to specific learner needs is therefore essential to ensuring the effectiveness and success of the learning process (Nuryasana & Desiningrum, 2020).

Design

Habibah and Oktavia (2022) stated that effective teaching materials are those that enable students to learn independently and with guidance from a teacher, while also helping them

achieve their learning goals. The instructional material developed in this research is strategically designed to align with the learning needs of the Text Written English Grammar course in the English Education Program at Universitas Muhammadiyah Muara Bungo. This Text Written English Grammar smart book is designed to cover 11 main topics, including parts of speech, types and sentences, subject-verb agreement, verb tenses, articles, modifiers, active and passive voice, punctuation and capitalization, direct and indirect speech, writing style, and common errors in writing. This smart book was also integrated with technology. Each chapter utilizes the Web Story Jumper and Word Wall game to provide online examples and exercises. Students can scan QR codes in this book to integrate it with those websites.

Development

Material expert validation, the material expert validation was conducted by a peer evaluator holding a master's degree in English literature, who also serves as the head of the English Education Department. The primary purpose of this validation was to assess the content feasibility, presentation quality, and linguistic appropriateness of the developed teaching material in support of the learning objectives for this course. The results of the material expert validation are presented as follows:

Table 3. *Material expert validation results*

No	Aspects	Score	Percentage	Criteria
1	Content	91%	81-100%	Highly Feasible
2	Presentation feasibility	90%	81-100%	Highly Feasible
3	Linguistics feasibility	91%	81-100%	Highly Feasible
	Total	90%	81-100%	Highly Feasible

Based on the results of the questionnaire assessment using a Likert scale, the developed material achieved an average score of 90%, which falls under the “Highly Feasible” category. Among the evaluated aspects, presentation feasibility received the lowest score; however, it remained within the highly feasible range. The validator generally said that the material was suitable for both students and lecturers who want to strengthen their writing skills by teaching grammar. Nevertheless, the validator also recommended adding a greater variety of exercises and more practical examples to facilitate students’ understanding of how grammatical concepts are applied in academic writing. Therefore, the results of the material expert validation indicate that the Text Written English Grammar smart book is appropriate for instructional use, with only minor revisions needed, particularly in the sections on practice activities and illustrative writing examples.

Media expert validation, the media validation of the Text Written English Grammar smart book was conducted by a media expert with a background in educational technology, who currently serves as the Secretary of the Information Technology Education Department and has substantial experience in validating various educational products. The purpose of this validation was to evaluate the book size, cover design, and content layout. The assessment instrument employed a Likert scale, and the overall validation results yielded a score of 84%, which falls into the “Highly Feasible” category. The validation findings indicate that the Text

Written English Grammar smart book meets the criteria of an engaging, communicative, and user-friendly instructional medium. The detailed score can be displayed as follows:

Table 4. *Media expert validation results*

No	Aspects	Score	Percentage	Criteria
1	Size	83%	81-100%	Highly Feasible
2	Cover Design	85%	81-100%	Highly Feasible
3	Content Design	85%	81-100%	Highly Feasible
	Total	84%	81-100%	Highly Feasible

Nevertheless, the media validator provided several recommendations for improvement. Some font sizes were too small, which may affect readability. Additionally, the validator suggested that the smart book would be more effectively utilized in digital format (e-book), as its visual elements appear more attractive and accessible when presented in a digital medium.

Implementation

The implementation stage is a crucial phase within the ADDIE development model, during which the instructional material that has been designed and validated is subsequently tested with the target learners. In this research, the instructional product, the smart book for the Text Written English Grammar course, was implemented among students of the English Education Program.

The implementation was conducted on a limited-scale trial and a large-scale trial. The limited scale targets a specific class currently enrolled in the Text Written English Grammar course. A small-scale trial was conducted with a limited number of participants, specifically 10 students from the English Education Program. The primary purpose of this trial was to evaluate the comprehensibility, attractiveness, and usability of the Text Written English Grammar smart book before its deployment on a larger scale. The results of the limited-scale implementation are presented as follows.

Table 5. *Limited scale trial*

No	Aspects	Score	Percentage	Criteria
1	Design	81%	81-100%	Highly Feasible
2	Content	82%	81-100%	Highly Feasible
3	Utilize	90%	81-100%	Highly Feasible
	Total	84%	81-100%	Highly Feasible

Based on the results of the questionnaire, students responded positively to the Text Written English Grammar smart book. This conclusion is proven by the data presented in the table above, which shows an average score of 84%, categorized as “Highly Feasible.” Additionally, feedback from respondents suggests that the smart book provided them with a new and captivating reading experience, thereby increasing their motivation and interest in the course.

Following revisions based on feedback from the limited-scale trial, the implementation proceeded to the large-scale phase, involving 30 students enrolled in the Text Written English Grammar course. The primary objective of this large-scale implementation was to evaluate the effectiveness of the smart book in supporting the teaching and learning process on a broader

scale. The evaluation was conducted using a Likert scale. The results of the student questionnaire from the large-scale trial are presented as follows. The results of the limited-scale implementation are presented as follows.

Table 6. *Large-scale trial*

No	Aspects	Score	Percentage	Criteria
1	Design	85%	81-100%	Highly Feasible
2	Content	85%	81-100%	Highly Feasible
3	Utilize	90%	81-100%	Highly Feasible
	Total	86%	81-100%	Highly Feasible

Based on the results, it is evident that the Text Written English Grammar smart book is highly suitable for instructional use. The average score of 86% demonstrates this, placing it in the “Highly Feasible” category. Students reported that the smart book significantly supported their understanding of grammatical concepts and enhanced their confidence in writing, as the exercises provided were practical and implementable.

Evaluation

The assessment of the Text Written English Grammar smart book occurred after the expert validation phase and was executed through both small-scale and extensive trials. The purpose of this evaluation was to assess the overall quality of the instructional material in terms of content accuracy, media design, and effectiveness in supporting the learning process.

Based on the analysis, the findings showed that, in terms of content quality, the smart book is well-aligned with the Course Learning Outcomes (CLOs) of the Text Written English Grammar course and was rated “Highly Feasible” by the material expert. From the media perspective, the instructional material was considered visually appealing, communicative, and user-friendly. However, minor revisions were recommended, particularly regarding the size of certain fonts, which the researcher has addressed.

Furthermore, the implementation results, both in the small- and large-scale trials, indicated positive responses from both students and lecturers. The average score was 86%, which put the material within the “Highly Feasible” category. Students’ qualitative feedback, in addition to quantitative data, supported the evaluation results. Many participants stated that the smart book helped them understand the course content beyond classroom hours and enhanced their interest in reading, as it provided them with a new and engaging learning experience.

Discussion

The effectiveness of teaching is fundamentally grounded in the careful and deliberate planning of instruction. Oktavia and Habibah (2022) noted that instructional materials are a fundamental component in fostering an effective and meaningful teaching and learning process. Therefore, well-designed instructional materials that align with the pedagogical needs of educators and the learning needs of students play a primary role in fostering the effectiveness of educational processes at all levels, from primary and secondary schools to institutions of higher education. In this current development, instructional materials have a

strong connection with technology. The continuous progression of technological, communicative, and informational developments, with the internet at the forefront, places increasing demands on Indonesian teachers to utilize such advancements as valuable educational resources in facilitating the learning process (Syakur et al., 2020).

In contemporary education, technology functions as an essential component that reinforces and advances the learning ecosystem through multiple impactful mechanisms. Technology encourages and fosters the learners to explore topics more deeply according to their interests and pace. Technology supports the teaching and learning process, making it more active and student-centered. The close relationship between technology and the teaching–learning process shares the goal of enhancing accessibility, engagement, personalization, collaboration, and future readiness in education. When integrated effectively, technology does not distract from or replace traditional pedagogy; instead, it acts as a catalyst that increases its effectiveness, resulting in a more meaningful and empowering educational experience for both instructors and students.

By integrating learning resources and technology, the researchers transform traditional teaching resources to support diverse learning needs and environments. It provides students with new experiences that enhance their knowledge and understanding. As found in this smart book development, both lecturers and students reacted positively to the new learning resources for the Text Written English Grammar course. This smart book is an attractive resource that helps students improve their comprehension of Text Written English Grammar. In alignment with this finding, initial research revealed that the smart digital book introduced an innovative approach enabling students to achieve course learning outcomes with greater ease and effectiveness (Habibah & Oktavia, 2022). The utilization of technology-based instructional material affords educators and learners enhanced opportunities to access instructional resources and engage in direct interaction, both within the classroom setting and virtually.

In addition, the findings of this research reaffirm the central position of instructional materials within an Outcome-Based Education (OBE) framework. Since OBE emphasizes clarity of learning outcomes, alignment between curriculum, teaching, and assessment becomes crucial. The Text Written English Grammar smart book was intentionally designed to align with the Course Learning Outcomes (CLOs) and Program Learning Outcomes (PLOs), ensuring that every unit, example, and exercise contributes directly to measurable competencies in written grammar and academic writing. This alignment is critical in higher education contexts where students are expected not only to understand grammatical rules but also to apply them critically and consistently in their own written work, both in academic and professional settings.

Furthermore, the results support previous claims that technology-driven materials can stimulate student motivation and engagement more effectively than conventional print-only resources. By embedding QR codes that connect to Web Story Jumper, Word Wall games, and other interactive platforms, the smart book positions learners as active participants who explore, practice, and self-evaluate in flexible ways. This multimodal design enables students with diverse learning styles—visual, auditory, or kinesthetic—to access content in ways that best suit their learning preferences. Such differentiation is consistent with the principles of

inclusive pedagogy and Universal Design for Learning, which advocate for multiple means of representation, engagement, and expression in the classroom.

The positive responses from both small-scale and large-scale trials also underscore the effectiveness of smart books in alleviating the perceived monotony often associated with grammar and writing courses. Traditionally, grammar instruction has been criticized for being overly rule-based, decontextualized, and teacher-centered. Through the integration of technology-enhanced tasks, contextualized examples, and interactive exercises, the smart book shifts the learning experience toward a more communicative and meaningful approach to grammar in real-world writing tasks. Students are required to identify or rectify grammatical errors and to compose paragraphs and texts that embody genuine communicative objectives, such as elucidating processes, articulating a viewpoint, or synthesizing sources.

Another important implication of this research lies in the professional development of lecturers. The process of designing, validating, and implementing the smart book shows that teachers can be both content experts and material developers. Engaging in research and development pushes lecturers to reflect on their pedagogical beliefs, analyze students' needs more systematically, and adopt new technological tools. This reflective cycle is beneficial for both creating high-quality teaching materials and supporting teachers' growth as creative educators over time. In institutions where resources are limited and imported textbooks do not fully match local curricula, lecturer-developed smart books can serve as contextually relevant, affordable, and sustainable alternatives.

Despite its promising outcomes, this development also presents several challenges that require acknowledgement. First, the implementation of a technology-integrated smart book presupposes that students have regular access to smartphones, stable internet connections, and a basic level of digital literacy. In regions where connectivity is uneven or where students share devices, these assumptions may not always hold. Therefore, lecturers need to design contingency plans, such as providing offline exercises or printed alternatives, to ensure that no student is disadvantaged. Second, lecturers themselves require ongoing training in selecting appropriate digital tools, designing QR-linked activities, and managing online platforms so that technology enhances rather than complicates the learning process.

Methodologically, the present research employed an R&D design with validation and trial stages but did not adopt an experimental or quasi-experimental approach that directly compares learning outcomes between students using the smart book and those relying on conventional materials. As a result, while students' perceptions, feasibility ratings, and qualitative feedback are highly positive, further studies are needed to provide stronger empirical evidence of its impact on measurable gains in grammatical accuracy, writing quality, and long-term retention. To triangulate quantitative and qualitative findings and generate more robust conclusions, future researchers could incorporate pre-test and post-test designs, control groups, or mixed-methods approaches.

From a broader perspective, the development of the Text Written English Grammar smart book also contributes to the discussion on how English for Specific Purposes (ESP) and English for Academic Purposes (EAP) can be supported through localized materials. The focus on written discourse, academic style, and error analysis reflects the realities faced by many Indonesian undergraduates who must produce essays, reports, and research papers in English. By exposing students to model texts, providing guided practice, and offering

technology-enhanced feedback opportunities, the smart book helps bridge the gap between general grammar knowledge and discipline-specific academic writing demands. This bridging function is vital for preparing students to participate more confidently in scholarly communication at national and international levels.

Finally, the success of this smart book suggests that similar development efforts can be replicated in other skill areas, such as reading, listening, and speaking, or in other courses across the curriculum. Collaboration between language, educational technology, and subject-matter lecturers from different fields could lead to a group of smart books that all follow the same design rules but cover different subject areas. In the long term, such initiatives may support the creation of an integrated digital–print ecosystem, where students move seamlessly between physical and virtual learning spaces, experiencing grammar and language not as isolated subjects but as essential tools for thinking, communicating, and participating in an increasingly digital world.

Conclusions and Recommendations

This research and development have successfully demonstrated the design, development, validation, and implementation of a technology-integrated smart book of Text Written English Grammar,” as a pedagogical innovation aligned with contemporary curriculum demands and the evolving objectives of English language education. The shift from a conventional grammar course to one that explicitly emphasizes the application of grammatical structures within written discourse reflects a broader pedagogical transformation, prioritizing functional language use, advanced writing competencies, and authentic communicative performance. Within this framework, the smart book emerges not merely as a supplementary learning tool but as a strategic instructional medium that bridges theoretical grammatical knowledge with practical writing proficiency.

Through the systematic application of the ADDIE development model, the research meticulously addressed all phases of instructional material production, including needs analysis, design, development, implementation, and evaluation, ensuring that the final product was both pedagogically robust and technologically responsive. The needs analysis revealed significant gaps in existing resources, underscoring the urgency for an innovative, integrated learning tool capable of fostering more profound student engagement and enhancing instructional effectiveness. The development process resulted in a comprehensive, curriculum-aligned resource that covers basic grammar topics and writing rules. It also includes interactive elements like exercises linked to QR codes, multimedia materials, and online practice tasks.

The rigorous validation process, involving both material and media experts, affirmed the high feasibility, accuracy, and appropriateness of the smart book, with both content and design receiving commendations for quality and pedagogical relevance. Furthermore, empirical findings from implementation trials both on limited and large scales demonstrated overwhelmingly positive student responses, with the instructional material significantly improving comprehension, retention, motivation, and writing confidence. The integration of technology enriched the learning experience and encouraged learner autonomy, critical thinking, and sustained engagement beyond traditional classroom settings.

Ultimately, the research substantiates the premise that innovative instructional design, when informed by thorough pedagogical analysis and enhanced by strategic technological integration, can profoundly transform the teaching and learning of grammar in written contexts. The Text Written English Grammar smart book represents a pioneering step toward a more dynamic, learner-centered, and outcome-oriented approach to grammar instruction. Its success demonstrates the potential for future research and development efforts to explore further the intersection of technology, pedagogy, and linguistic competence, paving the way for instructional materials that are not only contextually relevant but also responsive to the evolving demands of 21st century language education.

Future researchers should consider conducting larger-scale implementations across multiple institutions and diverse learner populations to examine the broader applicability and scalability of the smart book. Additionally, longitudinal studies could offer more details about their long-term impact on students' grammatical competence, writing proficiency, and overall language development over extended periods. Furthermore, while this research successfully integrated QR codes and online exercises, subsequent research could explore the incorporation of more sophisticated technologies, such as artificial intelligence (AI)-driven grammar feedback systems, adaptive learning platforms, and augmented reality (AR) features, to create more personalized and immersive learning experiences. Moreover, future research could be conducted using experimental or quasi-experimental designs to compare the effectiveness of the smart book with other instructional media, such as traditional textbooks, mobile applications, or interactive learning management systems. Such comparative analyses would yield more nuanced evidence regarding the relative efficacy of different pedagogical tools.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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