

Development of Christian religious education e-modules to improve junior high school students' learning outcomes

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Abstract: This study aims to develop a valid, practical, and effective Christian religious education e-module to improve student learning outcomes. This study used a research and development (R&D) method involving 28 students as research subjects. Data collection instruments included expert validation sheets, practicality questionnaires, and learning outcome tests administered before (pretest) and after (posttest) the use of the e-module. The results of the needs analysis indicate that students require flexible, easily accessible teaching materials that support independent learning, both inside and outside the classroom. The development results show that the e-module obtained a validity level of 87% from material experts and 92% from media experts, both of which are categorized as very valid. The results of the practicality test based on student responses were in the range of 89%–96%, indicating that the e-module is very practical to use in learning. Furthermore, the effectiveness test results showed an increase in the average student learning outcome score from 6.75 in the pretest to 12.78 in the posttest, with an N-Gain value of 0.73, which is considered high. Based on these findings, it can be concluded that the developed Christian religious education e-module meets the criteria of being valid, practical, and effective in improving student learning outcomes and supporting more flexible and independent learning.

Keywords: E-module, Christian religious education, independent learning

Abstrak: Penelitian ini bertujuan untuk mengembangkan e-modul pendidikan agama Kristen yang valid, praktis, dan efektif untuk meningkatkan hasil belajar siswa. Penelitian ini menggunakan metode penelitian dan pengembangan (R&D) yang melibatkan 28 siswa sebagai subjek penelitian. Instrumen pengumpulan data meliputi lembar validasi ahli, kuesioner kepraktisan, dan tes hasil belajar yang diberikan sebelum (pretest) dan setelah (posttest) penggunaan e-modul. Hasil analisis kebutuhan menunjukkan bahwa siswa membutuhkan materi pembelajaran yang fleksibel, mudah diakses, dan mendukung pembelajaran mandiri, baik di dalam maupun di luar kelas. Hasil pengembangan menunjukkan bahwa e-modul memperoleh tingkat validitas 87% dari ahli materi dan 92% dari ahli media, yang keduanya dikategorikan sangat valid. Hasil tes kepraktisan berdasarkan respons siswa berada dalam kisaran 89%–96%, menunjukkan bahwa e-modul sangat praktis untuk digunakan dalam pembelajaran. Selanjutnya, hasil uji efektivitas menunjukkan peningkatan rata-rata skor hasil belajar siswa dari 6,75 pada pretest menjadi 12,78 pada posttest, dengan nilai N-Gain sebesar 0,73, yang dianggap tinggi. Berdasarkan temuan ini, dapat disimpulkan bahwa e-modul pendidikan agama Kristen yang dikembangkan memenuhi kriteria valid, praktis, dan efektif dalam meningkatkan hasil belajar siswa dan mendukung pembelajaran yang lebih fleksibel dan mandiri.

Kata kunci: E-modul, pendidikan agama Kristen, pembelajaran mandiri

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INTRODUCTION

Advancement in digital technology has fundamentally changed the way education is taught from traditional learning to more interactive, flexible and learner-centered forms of education. The use of technology in education not only offers more access to learning material but also creates more innovative and relevant forms of education to meet the needs of modern society (Haleem et al., 2022). In this context, the use of technology needs to be

directed toward developing student-centered learning, through activities that encourage active participation, interaction, and cognitive engagement in the learning process (Schindler et al., 2017). One form of implementation is the development of digital teaching materials, namely learning resources presented in digital format and accessible through technological devices and platforms, such as computers, smartphones, and the internet.

The development and utilization of digital teaching materials require teachers to possess professional competence in selecting, designing, modifying, and integrating digital learning resources appropriately to student characteristics and needs (Heine et al., 2023; Indriani et al., 2026). However, optimizing technology in learning still faces challenges, particularly regarding teachers' mastery of digital competencies and their ability to design learning activities that meaningfully develop students' digital skills (Claro et al., 2024; Damopolii et al., 2023). Therefore, strengthening teachers' pedagogical and digital competencies is necessary through the implementation of learning strategies that systematically integrate technology, align with learning objectives, and support the creation of an active, participatory, and responsive learning environment to technological developments (Msambwa et al., 2024).

Initial observations were conducted at SMPN 4 Lembang. Discussions with the religious education instructor revealed that the only educational materials available to students were printed textbooks aligned with Christian religious education subject requirements. The use of printed religious education textbooks for grade VIII was suboptimal and insufficient to achieve innovative and creative learning objectives. According to the collected data, there are 28 students in the eighth grade, although the school distributes just 15 textbooks for them. This discovery suggests that the institution is unable to house all eighth-grade children. The quantity of used books remains somewhat restricted. After directly inspecting the facilities and infrastructure in the library at SMPN 4 Lembang, it was seen that several printed books were no longer suitable for use, where some of the physical printed books had been eaten by termites or rats. The study shows that the presentation of the school's printed books is not attractive to students, making them bored (Kasman et al., 2026; Setyantoko et al., 2023).

Based on preliminary data collection conducted at SMPN 4 Lembang, it was found that Christian religious education still prioritizes the use of printed media or textbooks. Consequently, learning is suboptimal due to a lack of interactivity. Furthermore, students are not maximizing their independent learning because they must be under teacher guidance. Data also shows that, of the 28 eighth-grade students, 11 still scored below the minimum completion criteria or were not successful. Furthermore, the Christian Religious Education teacher revealed that the use of electronic devices, such as projectors and mobile phones, in the learning process is still very rare, resulting in a more conventional learning style.

It can be concluded from preliminary data from observations, interviews, and documentation that one of the causes of suboptimal student learning outcomes is the dominance of printed textbooks, which tend to be textual and lack contextual presentation. Generally, printed textbooks are unable to accommodate the students characteristics in the digital era who require visual, interactive learning that is close to the realities of everyday life. Consequently, learners experience difficulty in understanding the material deeply and connecting the concepts learned to their real-life experiences. These initial findings then

provided the researchers with the insight to develop e-modules as a flexible and effective alternative for use in the learning process of Christian religious education subjects.

Several previous studies have developed e-modules for learning. The implementation of the e-module significantly enhanced student learning independence and learning motivation (Sidauruk et al., 2025). The level of effectiveness of the developed e-module in enhancing students' interest in learning and improving their learning outcomes is good (Dita et al., 2023). The developed e-module has met the criteria for validity and practicality for use in teaching (Nurzahra et al., 2025). The developed e-module effectively aligns with student needs, user-friendly features, and support for independent learning, practicality criteria, and significantly improves learning outcomes (Indriani et al., 2026). The use of digital learning resources led to students demonstrating increased intrinsic motivation and participation in digital discussions, as well as greater independence in accessing learning materials, while teachers observed increased classroom engagement (Misrianah et al., 2026). Previous research findings related to the issue of Christian religious education learning indicate that there is potential for using e-modules in teaching. This research aims to develop e-modules to improve student learning outcomes in Christian religious education subjects.

METHOD

The type of research used in this study is Research and Development (R&D). The development process consists of five stages, which are presented in Figure 1. This research was conducted at SMPN 4 Lembang, Pinrang Regency. In accordance with the existing problem at the school, namely the minimal use of digital teaching materials, this makes students sometimes feel difficult in the learning process, because printed teaching materials are the only learning reference given to students. Then the provisions of the independent curriculum are the use of digital open modules in the learning process. The subjects of this study were 28 grade VIII students, one Christian religious education subject teacher, one material/content expert validator, and a design/media expert validator.



Fig. 1. Development process

The digital module validity assessment instrument was a questionnaire completed by experts, namely media experts and material experts. This questionnaire used a Likert scale with four answer options tailored to the research stage and the purpose of administering the questionnaire. This instrument was a multiple-choice learning outcome test used to measure students' level of knowledge of the subject matter obtained after using digital-based teaching materials. Data from the needs analysis, validity, and practicality were analyzed quantitatively in percentage form following research standards (Ahmad et al.,

2026; Arif et al., 2026). Student learning outcomes were calculated using scores and difference values. Furthermore, the n-gain value was calculated following Hake (1998) standards.

RESULTS AND DISCUSSION

Based on the results of a needs analysis conducted through interviews with Christian religious education teachers, it was discovered that learning is still dominated by conventional methods, such as lectures and the use of printed textbooks, and is not yet supported by interactive and contextual digital teaching materials. Although most students have access to smartphones and the internet, the utilisation of technology in the learning experience is not appropriate. Therefore, it is necessary to develop interactive digital modules that are appropriate to the characteristics of students and the multicultural environment. Christian religious material, such as love, forgiveness, responsibility, and the life of Jesus Christ, should be presented through narrative videos, animated biblical figures, interactive quizzes, and audio reflections to make them more engaging, meaningful, and relevant to everyday life. Furthermore, teachers need training in the use and development of digital teaching materials to enhance learning creativity. The development of these modules is expected to support the strengthening of digital literacy, differentiated learning, and the understanding and application of Christian faith values in students' lives.

Table 1. Results of student needs identification

No	Question	Yes	No
1	Have you ever experienced difficulties while learning Christian religious education material?	20	8
2	Do teachers use printed textbooks during Christian religious education lessons?	22	6
3	Do printed textbooks in Christian religious education lessons interest you?	24	4
4	Have teachers ever employed instructional materials other than printed textbooks in Christian religious education lessons?	1	27
5	Does using teaching materials other than printed textbooks in Christian religious education lessons increase your interest in learning?	21	7
6	Have you ever heard of digital teaching materials?	17	11
7	Learning materials, picture, audio, and videos are all included in digital teaching materials. Would you be interested in incorporating digital teaching materials into Christian religious education lessons?	23	5
8	Do you find it simpler to comprehend the material, particularly in Christian religious education courses, when you watch learning videos?	20	8
9	Do digital teaching materials make them easily accessible during class hours and outside of school?	20	8
10	Do you concur with the utilisation of digital teaching materials in Christian religious education lessons?	27	1
Total		195	85

Based on the results of a needs analysis using a 10-question questionnaire to 28 students at SMP Negeri 4 Lembang, it was found that Christian religious education learning is still dominated by the use of printed textbooks, which are considered less interesting, resulting in some students having difficulty understanding the material. The use of alternative teaching materials is also still limited, although students have shown a positive response to more varied learning. Most students are familiar with digital teaching materials and have a high interest in interactive learning media that combine text, images, audio, video, and quizzes. Students also need teaching materials that are flexible, easily accessible, and support independent learning both inside and outside the classroom. Therefore, the creation of digital teaching materials is essential to enhance student engagement, motivation, comprehension of the material, and learning outcomes by providing a more interactive, contextual, and personalised learning experience that is specific to the requirements and characteristics of the students. The findings of the requirements analysis in the research on the development of digital instructional materials are the foundation for the development of products that can enhance student learning outcomes (Fitriyah et al., 2025; Imbiri et al., 2026; Wahyudin et al., 2026).

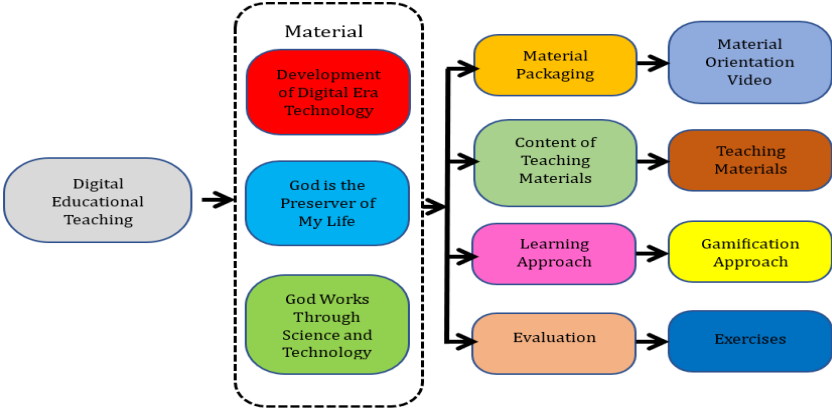


Fig. 2. Prototype of digital teaching materials for Christian religious education

This prototype digital teaching material for Christian religious education is designed as an interactive learning medium that integrates Christian theological values with developments in science and technology (Figure 2). The prototype is structured systematically to support the achievement of students' cognitive, affective, and psychomotor learning objectives.

Digital teaching materials for Christian religious education

This section represents the prototype's main concept since it implies that the product is a technological tool that delivers digital educational materials. These materials are applicable to the students' process of learning the Christian religion in the digital age, which helps them learn and relate its theoretical concepts to the realities of modernity..

Core content (theological and contextual framework)

The center of the prototype (marked with a dotted line) shows the core learning content, which contains three main topics as theological and contextual foundations. The

sub-topic "God Works Through Science and Technology" emphasizes the theological understanding that the development of science and technology is part of God's work in preserving and developing human life. Students are guided to understand that science and technology are not contradictory to the Christian faith but can be a means to glorify God when used responsibly and ethically. The sub-topic "Technological Developments in the Digital Era" discusses the phenomenon of digital technology development in students' daily lives. The material is presented contextually to help students recognize the positive and negative impacts of digital technology and develop critical, wise, and responsible attitudes based on Christian values. The sub-topic "God Preserves My Life" focuses on the reflective and affective aspects, namely the awareness of faith that God always preserves human life, including in the use of technology. Students are encouraged to reflect on the role of Christian faith in facing the challenges of the digital era and internalize the values of trust, gratitude, and moral responsibility.

Digital learning presentation flow

The right side of the prototype displays a series of steps that can be used to develop a systematic and interactive learning process. An orientation video is included which will be used to introduce the learners to the lessons, topics, and issues under study. The decision to use videos was made because it will motivate the students and help them understand the relevance of the lesson. Teaching materials were presented using text, images, and contextual analysis to expound on the lessons. The materials were developed in an interactive and communicative manner so that the learner can study independently or with the instructor's help. Gamification was used as a strategy to motivate the learner to gain mastery over the content. Educational games helped to promote positive attitudes and reinforced honesty, cooperation, and responsibility among the learners. Questions were integrated into the learning process to evaluate and reinforce understanding. The questions were designed to be cognitive and reflective to enable the learner to recall and apply the lessons learned in their daily lives. Evaluation was the final step used to determine the extent to which the learning objectives were achieved. Learning evaluation was done using computer-assisted or digital tests and evaluations to measure the learner's cognitive responses, attitudes, and reflection on faith.

The fourth step in the development of digital teaching materials involved initial design. This stage comprised designing the media to be used to develop the teaching materials. The initial design of the digital teaching materials was performed to develop a comprehensive storyboard of the learning media to be produced. The stage also involved developing a systematic way of presenting the information, which included material flow, display design, and the use of multimedia resources such as video, text, and audio. It also involved identifying interactive activities that could be used to deliver Christian Religious Education lessons to the learners (Figure 3).

The digital teaching materials are packaged in the form of interactive e-modules that can be accessed through digital devices such as laptops, computers, and smartphones. These teaching materials contain the main material on Christian religious education, presented systematically and structured, starting from an introduction to the material, concept presentation, in-depth study through Bible verses, and assignments and evaluations. The material is presented in a manner that is both comprehensible and conducive to

independent learning. These e-module materials are enhanced by a variety of multimedia components, including instructional videos, pictures, and basic animations that are pertinent to the subject of Christian religious education. The use of multimedia aims to clarify concepts, strengthen student understanding, and increase interest and motivation in learning. In addition, there are reflective activities that encourage students to relate the values of the Christian faith to everyday life. The digital teaching materials are also equipped with practice questions and digital-based evaluations designed to measure students' understanding of the material. These exercises and evaluations are structured in stages and supplemented with feedback, so students can immediately determine their level of mastery of the material. This helps students improve their understanding and enhance learning outcomes.

		
Text, Images and Video	Description	Action
Text, Images, and Video	The Materials Page This page is the core of Christian Religious Education. The material is presented contextually, connecting biblical teachings to students' daily lives.	1. Text: chapter title, learning objectives, and concept descriptions. 2. Images: contextual illustrations. 3. Videos: hyperlinks to YouTube videos explaining the material. 4. Actions: navigation buttons between pages.

Fig. 3. Storyboard

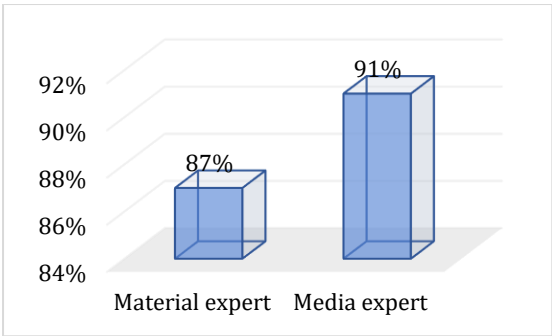


Fig. 4. Assessment results by the validator

The e-module was classified as highly valid with a score of 87%, as indicated by the validation results from material experts (Refer to Figure 4). This suggests that the teaching material has met the content requirements, including the suitability of the material, objectives, accuracy of facts, images, and videos. The validation results of digital teaching materials conducted by design and media experts indicated that the developed teaching materials were classified as highly valid. The visual appearance aspect was evaluated at 92%, suggesting that the digital teaching materials were designed in a manner that was proportional, attractive, and in line with the characteristics of junior high school students.

The learning materials were deemed to be effectively delivered by the layout, colour selection, and use of illustrations.

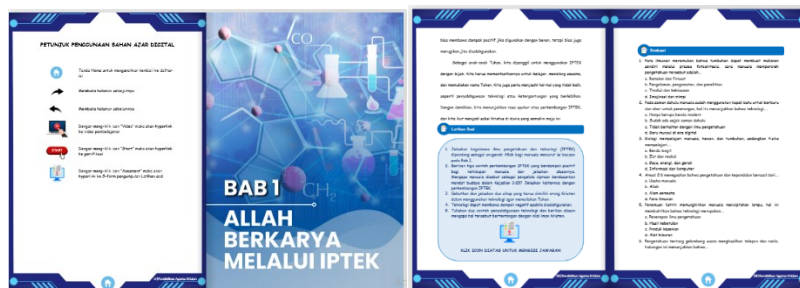


Fig. 5. Example of the display of digital teaching materials for Christian religious education

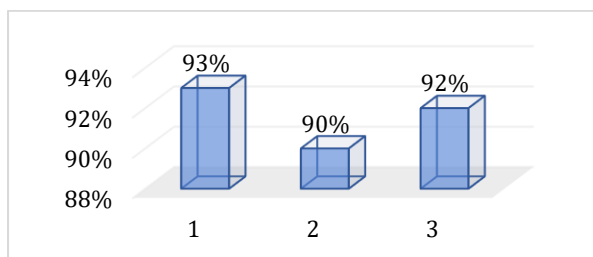


Fig. 6. Student responses in individual trials

Based on the results of the practicality data analysis from the individual trial response questionnaires (Figure 6), the scores obtained were 89, 86, and 88, respectively, with average percentages of 93%, 90%, and 92%. These percentages are in the very high category, indicating that the e-module for Christian religious education developed have a very high level of practicality. These results indicate that the digital teaching materials are easy to use, easy to understand, and can be implemented effectively in the learning process in junior high schools. With an excellent level of practicality, these digital teaching materials support more efficient and interactive learning implementation, both from the teacher and student perspectives, and have the potential to improve the quality and learning outcomes of students.

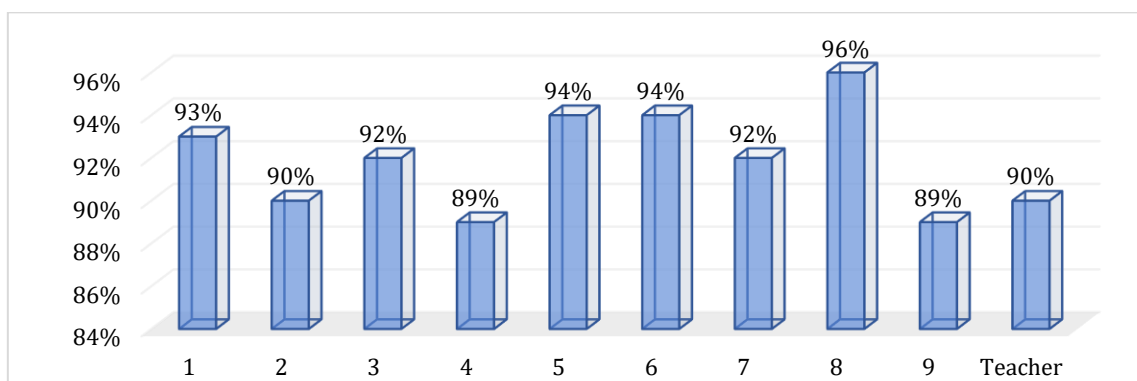


Fig. 7. Student and teacher responses in small group

Based on the assessment analysis results, the digital teaching materials for Christian religious education demonstrated a very high feasibility and practicality (Figure 7). The

assessment percentages ranged from 89% to 96%, all of which fell into the very practical category. This indicates that every aspect assessed in the digital teaching materials met the established quality criteria. Percentage values of 93%, 92%, and 90% indicate that the digital teaching materials are of very high quality in terms of material presentation, ease of use, and suitability for learning objectives. The systematic presentation of the material, supported by multimedia, is considered to help students understand the Christian religious education material more easily and engagingly. Teacher responses showed a percentage value of 90%. This percentage falls into the very practical category, indicating that the developed digital teaching materials have met the established quality criteria. This value indicates that the digital teaching materials have a high level of ease of use, both in terms of appearance, navigation, and material presentation, so they can be used practically in the learning process. Student and teacher responses indicate that the product meets the practicality requirements for use in teaching (Wanaha et al., 2025).

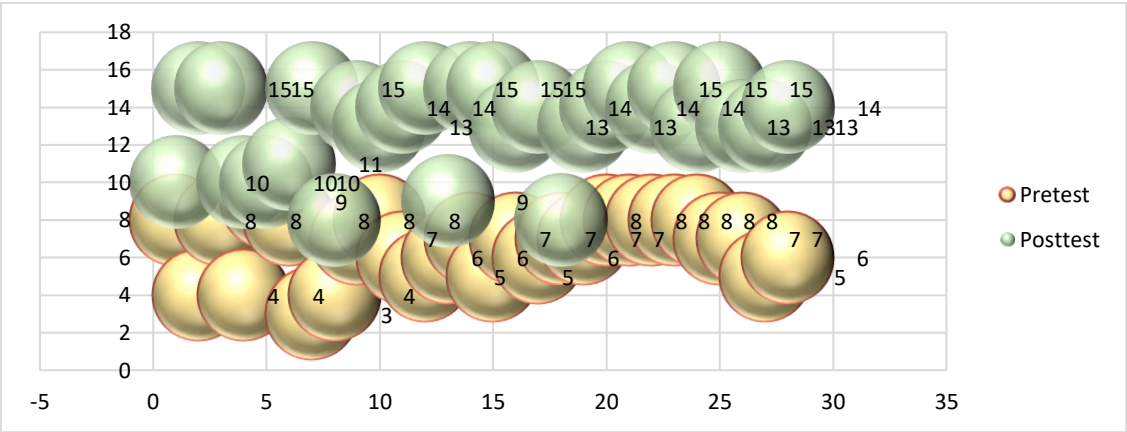


Fig. 8. Pretest and posttest of students after learning

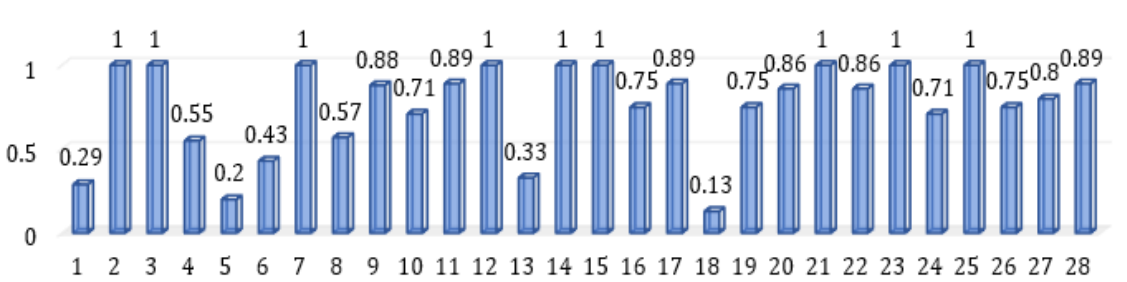


Fig. 9. N-gain measurement results

The average N-Gain score was 0.73, which is considered high, as indicated by the N-Gain test results (Figure 9). This outcome suggests a substantial enhancement in the overall learning outcomes of students subsequent to the administration of the e-module. The average score increased from 6.75 in the pretest to 12.78 in the posttest, which further substantiated this improvement (Figure 8). The majority of students achieved high N-Gain scores, with a few even surpassing the maximum score of 1.00. A significant improvement in student learning outcomes from pretest to posttest is indicated by a maximal N-Gain score of 15. Optimal improvement in learning outcomes is indicated by the value being

closer to 1, which indicates that the learning or teaching materials used are more effective. Consequently, it can be inferred that the e-module treatment that was implemented in this study was effective in enhancing learning outcomes.

These findings indicate that the use of e-modules is accompanied by a significant increase in mastery of the learning material. These improvements can be explained by the characteristics of the digital learning materials developed, including an attractive appearance, ease of understanding, clear and structured presentation, use of communicative language, flexible access, opportunities for repetition, and support for independent learning. Furthermore, the integration of learning videos, gamification, and practice exercises has the potential to provide a more interactive and meaningful learning experience. These characteristics can complement each other in supporting improved learning outcomes by strengthening students' attention, active engagement, conceptual understanding, and ability to manage their learning process.

One factor that has the potential to support improved learning outcomes is an e-module display that is attractive and appropriate to the characteristics of students. The use of a systematic combination of colors, illustrations, images, and layouts can help attract students' attention and increase their interest in learning the material. An attractive visual display not only has an aesthetic function, but also plays a role in helping students identify important information and understand the relationships between concepts. This is in line with research by Plass et al. (2014) which shows that the use of visual design elements, especially color and shape, can influence positive emotions and support understanding in multimedia learning. Interest in the e-module display can also be a factor that encourages students to be more active in learning, especially since the results of the needs analysis at SMP Negeri 4 Lembang showed that the use of printed textbooks was previously considered less attractive by some students. However, an attractive display needs to be supported by a clear, structured presentation of material and use of easy-to-understand language so that students' attention is not only focused on the visual aspects, but also on the learning substance. Presenting material in stages, from concept introduction, explanation, examples, and evaluation, can help students build a systematic understanding. Presenting multimedia material in meaningful segments has a positive influence on knowledge retention and transfer (Ardono et al., 2026; Noryanto et al., 2026; Rey et al., 2019). Thus, the combination of an attractive presentation, systematic material structure, and communicative language has the potential to make it easier for students to understand Christian religious education material that contains various abstract religious concepts and values.

The ease of understanding the material is also related to the use of learning video features, which allow information to be presented through a combination of moving images, illustrations, narration, and sound. Audiovisual presentation of material has the potential to help students gain a more concrete understanding of the concepts being studied (Nasrul et al., 2024; Rahayu et al., 2024). Students can engage in meaningful learning by selecting, organising, and integrating visual and verbal information with their existing knowledge. In the context of Christian religious education, the use of learning videos can help clarify material through illustrations of events, examples from everyday life, and the application of Christian faith values in various situations. Through videos, students not only read written explanations but also obtain visual representations that support conceptual understanding. Burga et al. (2025) elucidate that the efficacy of instructional videos is contingent upon the

management of cognitive burden, learner engagement, and the implementation of active learning. These findings are supported by Noetel et al. (2021) systematic review, which showed that the use of videos can improve learning outcomes in higher education contexts.

In addition to helping clarify material, e-modules can also create a more enjoyable learning experience through the integration of gamification features. The use of game elements in learning has the potential to increase student engagement because learning activities are not only centered on reading or listening to explanations but also involve active participation in solving learning challenges. Gamification allows students to have a more varied learning experience, thereby increasing their interest in participating in the learning process. Gamification has a positive influence on student learning performance (Arif et al., 2026; Sucipto et al., 2026). These results are corroborated by a meta-analysis conducted by Bai et al. (2020), which determined that gamification has a moderate effect size and a positive impact on learning outcomes. The findings of this investigation suggest that the integration of game elements with learning objectives may serve as an effective approach to enhance student engagement and academic performance. Gamification has the potential to facilitate the comprehension of material in Christian religious education by requiring students to apply their knowledge, respond to enquiries, and resolve challenges that are pertinent to the concepts being studied. Students are more likely to engage with the learning materials when they experience a sense of enjoyment when utilising engaging features. Therefore, gamification can be regarded as one of the factors that contribute to the enhancement of learning outcomes by fostering a learning experience that is more interactive, enjoyable, and encourages active participation of students.

The presence of practice tests also enhances active engagement in learning, enabling students to assess and enhance their comprehension of the material they have acquired. Practice tests are not only used to evaluate learning outcomes, but they also integrate into the learning process by motivating students to apply, connect, and recall the information they have acquired. As a learning reinforcement strategy, retrieval practice is the act of retrieving information from memory. This process is associated with this concept. Adesope et al. (2017) demonstrated through a meta-analysis that practice testing benefits learning and knowledge retention compared to several learning conditions without testing.

Improved learning outcomes can also be attributed to the flexibility of e-modules, which allow students to access materials in school or outside of school as needed. This flexibility provides students with the opportunity to revisit material they haven't yet grasped without always relying on classroom learning time. The ability to review material is an important characteristic because each student has a different learning pace and level of understanding. Through digital learning materials, students can reread explanations, rewatch learning videos, access specific materials, and complete practice tests to strengthen their understanding. Dunlosky et al. (2013) explained that regular learning and information recall exercises are strategies with strong empirical support for improving learning outcomes. Therefore, flexibility and the opportunity to review material can be beneficial if utilized actively and purposefully. This also aligns with research by Damopolii and Kurniadi (2019), and Dita et al. (2024), which found that integrating digital devices into learning positively impacts student learning performance. In the context of SMP Negeri 4 Lembang, the ability to access digital learning materials outside of class has the potential to expand learning opportunities, especially when students need additional time to understand

concepts they haven't yet mastered. However, this flexibility still depends on the availability of devices and access that support the use of e-modules.

Improved student learning outcomes after using the Christian religious education e-module at SMP Negeri 4 Lembang can be understood through the interconnectedness of various mutually supportive characteristics of the learning materials. An attractive presentation and gamification features have the potential to increase student interest and engagement in learning. Clear, structured presentation of material, using communicative language, and supported by learning videos can help students comprehend information and build conceptual understanding. The existence of practice questions provides an opportunity to strengthen knowledge and evaluate understanding, while the flexibility of access and the ability to repeat the material allows students to adjust learning activities to their individual needs.

CONCLUSION

The e-module developed for Christian religious education meets the criteria of feasibility, practicality, and efficacy as a digital teaching material for enhancing student learning outcomes, as indicated by the results of the research and development conducted. The e-module is classified as highly appropriate for educational purposes, according to expert validation results. The practicality assessment, which is based on the responses of students and teachers, suggests that the e-module is user-friendly, can be accessed flexibly, and supports independent learning activities both inside and outside the classroom. The utilisation of the e-module demonstrated a substantial improvement in student learning outcomes from an effectiveness perspective. Consequently, the e-module that has been developed can be employed as an alternative digital teaching material that is practicable, effective, and feasible to enhance the quality of the learning process and outcomes in Christian religious education.

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