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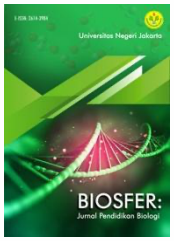

Designing a STAD-based differentiated e-module to enhance instructional quality in digestive system with Qur'anic integration

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ABSTRACT

This development research aims to produce valid and practical e-modules based on Differentiated Instruction using the STAD model, integrating Al-Qur'an content in the Digestive System topic. This type of research is development research (R&D) using the 4D model (define, design, develop and dissaminate), but the research was limited to the development stage due to constraints in time and funding. This research was conducted in grade XI of senior high school during the 2024/2025 school year. The sample in this study were class XI students totaling 33 people. The e-module was designed using the Canva application then converted using heyzine flipbook and liveworksheets for student worksheets, after completion of the e-module design, it was assessed by material, media and language and design validators using an instrument in the form of a validation questionnaire. The e-module was then tested on a small group to see the level of practicality of the product using the teacher and student response sheet instrument. The sheets were then analyzed using the percentage validation and practicality formulas. Data collection was obtained from the results of the validator questionnaire and student respondents. The results of the study showed that the resulting e-module was very valid with a validation score of 86% and very practical with a response percentage of educators at 100% and students at 89%. Based on the responses of the educator and student questionnaires, the e-learning module is categorized as highly practical and can be used in the learning process.

INTRODUCTION

The integration of technology in education has significantly transformed traditional learning resources, replacing printed textbooks with digital formats such as e-modules. The selection of appropriate instructional materials plays a crucial role in enhancing learning outcomes, as well-chosen materials can develop learners' intelligence and potential (Khastini et al., 2023). Learning is not only an interaction between teachers and students within an educational environment but also a conscious effort by educators to address the diverse needs and interests of learners (Akhiruddin et al., 2020).

Each student possesses unique learning characteristics, including learning styles, which require personalized instructional approaches. As Himmah and Nugraheni (2023) argue, such differences necessitate that teachers adapt their methods to suit the distinct needs of their students. However, observations and interviews at grade XI of senior high school reveal that despite the adoption of the *Kurikulum Merdeka*, its implementation remains suboptimal, particularly in biology education. The learning process is still dominated by traditional lecture methods, with minimal differentiation based on students learning styles even though such data is available. Furthermore, the instructional materials currently in use do not integrate Islamic values and fail to support the religious and moral components of the *Profil Pelajar Pancasila*. Existing electronic modules are also perceived as visually unappealing and lacking in essential features such as clear illustrations, summaries, glossaries, and evaluations. These issues underscore the need for contextualized, differentiated, and value integrated instructional materials. Differentiated learning, one of the core strategies promoted in the *Kurikulum Merdeka*, places students at the center of the learning process by addressing individual differences in readiness, interests, and learning profiles. Alfath et al. (2023) explain, differentiated instruction creates inclusive classrooms, enhances access to learning, and boosts student motivation and achievement. To implement differentiated instruction effectively, educators must adopt specific pedagogical approaches such as *Differentiated Instruction* (DI), which are designed to manage learner diversity by tailoring content, processes, and learning environments. Differentiated Instruction (DI) is a learning approach in which learning is tailored to the needs of diverse learners to optimize the potential of each learner (Tomlinson, 2017), therefore, the selection of appropriate teaching materials is able to overcome differences in student characteristics.

In this regard, technology has affected the world of education, especially in the learning styles of students. Learners prefer to find information assisted by technology (Bakti et al., 2023). Biology learning not only involves memorizing concepts but also requires biology educators to use a variety of strategies in order to communicate the subject matter visually and effectively, ensuring that learners can easily understand and develop meaningful understanding (Afelia et al., 2023). For this reason, it is necessary to develop electronic modules that can facilitate the diversity of learning styles of students, such as visual, auditory, and kinesthetic. To make the use of e-modules effective, a learning model needs to be used in the implementation of learning. The STAD learning model is included in a cooperative learning model that helps develop positive attitudes of students towards themselves, peers, adults, and learning in general (Ramadhanti & Yanda, 2018). The characteristics of the material in the form of processes need to be developed through teaching materials to support the various needs of students according to learning styles, including the digestive system.

In the Islamic view, science is interrelated with religion and God. Science that is not based on Qur'anic knowledge will trigger the development of science outside Islamic principles and have a negative impact. Therefore, integrating the Islamic basis in teaching material is very important to realize the profile of Pancasila students (Permana et al., 2023). Through the consistent integration of religion and science, very powerful resources can be generated for the application of science. The Qur'an serves as a source of inspiration, and science explains the truth of its verses (Zulfa, 2022). Teaching materials are arranged systematically, adjusted to the characteristics of the subject matter and the characteristics of students. Teaching materials are an important component in assessing how effective a lesson is (Nurul, 2021). E-modules are digital teaching materials where students are able to learn independently in solving existing problems. E-modules have advantages over printed modules because they are more interactive, can show images, audio, video, and animation, have formative tests or quizzes with feedback, and contain complex content (Jayanti & Pertiwi, 2023).

E-modules must pay attention to device availability and display size. In general, modules have the characteristics of self-instructional, self-contained, self-alone, adaptive, and user-friendly so that learning can be done independently and meaningfully (Destiansari et al., 2024). The attractive

appearance of e-modules helps teachers explain lessons and achieve learning objectives in a more efficient, less boring, and fun way. In addition, it can encourage teachers to improve their learning outcomes, build independence, and master the material. So, e-modules can be packaged attractively with the help of a software known as Flipbook that provides users with a book-like experience while supporting digital media such as animation, images, video and audio (Dayanti et al., 2021). With the Differentiated Instruction (DI) approach can have a positive impact on the learning and teaching process and can adjust to the needs of each learner.

Based on research by Lindawati (2022), the Differentiated Instruction approach is effective in improving learning outcomes, as evidenced by an increase in the percentage of learning completeness in the first cycle. This improvement continued in the second cycle, indicating the approach's effectiveness over time. Furthermore, Winangsih and Harahap (2023) emphasized that the use of appropriate teaching materials enhances interaction between educators and students and helps maintain student engagement throughout the learning process. Research by Suhaeri and Daud (2022) also supports this, showing that differentiation-based learning tools in biology education are categorized as very practical and effective in improving student learning outcomes. Mayasari et al. (2023) found that STAD (Student Teams Achievement Division)-based e-modules on the topic of the digestive system for grade XI students are highly feasible as supplementary teaching materials, based on their validity and practicality in terms of content, language, presentation, and usability. The STAD model, which emphasizes collaborative group learning and peer teaching, complements Differentiated Instruction by allowing students with varying abilities to work together and learn from one another in a structured manner. This synergy supports personalized learning while fostering teamwork and accountability. However, despite these findings, there is limited research that integrates Differentiated Instruction with the STAD cooperative learning model in the development of e-learning modules, particularly in the context of integrating Al-Qur'an content. This creates a research gap in exploring how these two approaches can be effectively combined to enhance learning outcomes and student engagement in Islamic-based science education.

Recent studies highlight the importance of integrating technology with pedagogy to accommodate diverse learners. However, most digital modules remain generic, lacking features tailored to learning styles or aligned with character education goals such as religious integration (Khastini et al., 2023; Lubis et al., 2024). While some efforts have been made to adopt differentiated instruction (DI), practical models that integrate DI with contextual digital modules rooted in religious values remain limited, especially in Indonesian high school biology education. Theory and facts in the field are often different. Based on interviews with biology teachers, during the learning process teachers more often use printed books and very rarely use teaching materials in the form of electronic modules and do not integrate with Islamic values. In addition to teaching materials, teachers also rarely use the STAD learning model because during the learning process teachers more often use the lecture method, lack of differentiated learning concepts that make students tend to be passive in the learning process. In the learning process, educators explain religion and science material without the help of teaching materials, making it difficult for students to understand. So, teaching materials must be made to support students' learning objectives. Specialized teaching materials can help learners learn and make it easier for them to learn on their own (Jamil et al., 2022). This study introduces a contextual e-module on the human digestive system that integrates Qur'anic values and employs the STAD cooperative learning model. Designed to support differentiated instruction based on students' learning styles, the module aligns with the goals of *Kurikulum Merdeka* and the *Profil Pelajar Pancasila*. The urgency of this research lies in addressing the gap between curriculum intent and classroom practice. Although *Kurikulum Merdeka* emphasizes student-centered and differentiated learning, its implementation remains limited due to the lack of appropriate instructional materials and insufficient teacher readiness. Therefore, this study responds to the urgent need for value-integrated, interactive digital resources that accommodate diverse learner needs and promote more effective learning experiences. This development aims to determine the level of validity and practicality of the product to improve learning.

METHODS

Research Design

This study used a development research design (R&D) using the 4D model. Thiagarajan et al. (1974) suggested that development research includes the stages of define, design, development, and

dissemination. However, this study was limited to the 3D phase (define, design, and develop). The stages performed in this research can be seen in **Figure 1**.

Population and Samples

The participants consisted of 33 students from class XI.F.1, selected based on their alignment with the cognitive level and content of the instructional material. They were involved in evaluating the developed e-module using a questionnaire to assess its practicality and acceptability within the framework of Differentiated Instruction integrated with the STAD model. In addition, the study involved three expert validators: two university lecturers serving as design and media experts, and one biology teacher acting as a subject matter expert.

Instrument

The instruments used at the definition stage are interview sheets to capture the analysis of teacher needs, and questionnaires to find out the analysis of student needs. The research instruments used at the development stage are validation sheets for validity sheets, validity sheets for products, validation sheets for teacher and student practicality sheets, and E-module user response questionnaires distributed to teachers and students. The validation instrument is used to assess the e-module from the aspects of didactic, constructive, linguistic, and technical. The user response questionnaire given to teachers and students was used to assess the level of practicality of the e-module in terms of ease of use, efficiency in learning, and benefits. Responses and evaluations for the validation sheet utilized a modified Likert scale. The Likert scale is employed to measure attitudes, opinions, and perceptions of individuals or groups regarding social events or phenomena (Riduwan, 2010).

Procedure

This study employs the 4D development model, which consists of four stages: Define, Design, Develop, and Disseminate. During the Develop stage, expert validation was conducted involving three specialists: a media expert, a design expert, and a subject matter expert. The validation instruments assessed several indicators, including didactic quality, construct validity, language accuracy, and technical aspects. Following this, empirical validation was performed to evaluate the practicality of the developed e-module, involving 33 students and one educator as respondents. The practicality evaluation focused on indicators such as ease of use, learning time efficiency, and the benefits gained from using the module.

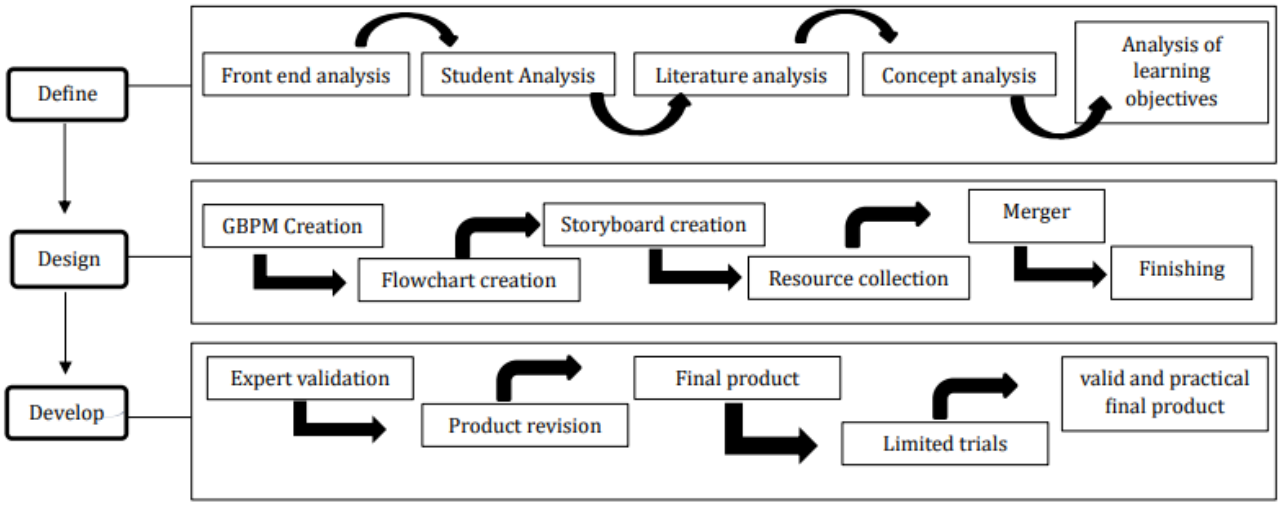

Figure 1. The stages conducted in the research

The defining stage is carried out to identify problems that occur in classroom learning. This stage includes: (1) Front-end analysis to identify the fundamental problems in biology learning through interviews with teachers and students; (2) Student analysis aims to identify the characteristics of students so that it is easy to group them in the learning process. (3) Literature analysis is conducted to find out how best to use the materials and media used in the learning process; (4) Concept analysis is conducted to find out the format and components of the e-learning module to be developed as well as the suitability of the material in the textbook with the e-learning module to be developed; (5) Analysis of learning objectives is used as a basis for designing learning e-modules.

The design stage aims to design the e-module by preparing a prototype of the e-module to be developed. The steps taken at this stage include: (1) creating a Media Program Outline (GBPM) which begins with identifying the e-module creation program, where there are important elements such as title, learning objectives, subject matter and other components that will be included in the developed e-module; (2) creating a flow chart, this step shows the sequence and relationship between learning materials in the module developed based on learning styles using the STAD model will visualize the material in the e-module; (3) creating an e-module storyboard, this step includes creating a design that determines the visual appearance and how the material is organized in the e-module that has been developed; (4) collecting resources, this step is carried out by collecting the resources needed to create e-modules from various relevant sources including components such as images, animations, fonts and the concept of learning styles which include visual, auditory and kinesthetic; (5) This incorporation step is carried out by designing the module using the Canva application and converting it into the Heyzine Flipbooks website and worksheets designed with liveworksheet; (6) finishing, this stage includes a review of the e-module that has been designed, which aims to ensure the suitability, harmony, and quality of the e-module developed as a whole.

The development stage is a stage that aims to produce valid and practical products through validation and practicality activities based on the opinions and suggestions of educational experts (validators). This stage includes: (1) The validity stage, at this stage the developed e-module is validated by a validator consisting of three experts. The validation process is carried out to determine the validity of the product and support product development (Annisa & Darussyamsu, 2023). At this stage, the validator is given a learning e-module designed to check validity. Four aspects are validated, namely: content validation, construct validation, technical validity, and linguistic validity. (2) This stage will be carried out by conducting a limited trial in the classroom. The purpose of this trial is to find out whether the learning e-module based on differentiated instruction with the STAD model on the material of the digestive system integrated with the Qur'an can be used in Class XI.

Data Analysis Techniques

In this study, descriptive analysis techniques were used to describe the validity and practicality of e-module development using types of instruments as questionnaires: needs analysis, expert feasibility test, and teacher and student response tests. 1) Scoring was based on a modified Likert scale with four response options: strongly agree (score 4), agree (score 3), disagree (score 2), and strongly disagree (score 1) (Riduwan, 2010); 2) Computing the total score for each validator by aggregating the scores obtained from each indicator statement; 3) Calculating the validity percentage using a predetermined formula; (4) The results were interpreted using predetermined criteria: a percentage of 0–20% indicates not valid, 21–40% less valid, 41–60% fairly valid, 61–80% valid, and 81–100% highly valid. The same percentage range was applied to practicality criteria, categorized as not practical, less practical, fairly practical, practical, and highly practical. If the score is less than 0.61, the learning e-module is invalid and not suitable for use, so it needs to be revised, but if the value is more than 0.61, the learning e-module is declared valid and suitable for use. In addition to validation analysis, researchers also conduct practical analysis for teachers and students (Riduwan, 2010).

RESULTS AND DISCUSSION

This study's product development is grounded in the research and development procedure outlined in the preceding chapter, specifically the 4-D model. The resulting product is an e-learning module based on Differentiated Instruction, incorporating the STAD model, and focusing on the Digestive System topic integrated with Al-Qur'an content for grade XI senior high school. The 4-D model comprises four stages: definition, design, development, and dissemination. Due to temporal and financial constraints, this study was limited to the development stage. The outcomes of each stage are presented.

Define Stage

This stage is conducted to identify problems occurring in classroom learning. Once the problems are examined, the specific needs of the students to support the learning process can be determined (Mufida et al., 2022). The define stage is the stage to determine and define learning needs using the development of learning e-modules. The define stage includes five main steps, namely front-end

analysis, student analysis, literature analysis, concept analysis and learning goal analysis. (1) At the front-end analysis stage, information was obtained that in the learning process educators have not used varied media and tend to be monotonous, this is due to the methods used by educators when teaching. Educators stated that they have implemented the STAD model, but there are no STAD-based learning modules yet. Then the existing teaching materials do not relate biology learning materials to Islamic teachings and values. Through a consistent integration between religion and science, a very powerful resource can be generated for the application of science. The Qur'an serves as a source of inspiration and science explains the truth of its verses (Zulfa, 2022); (2) The analysis of students at this stage was obtained that, They have different learning styles, such as visual learners' learning styles they understand better through texts equipped with images and videos, auditory learning style learners state that they need verbal or audio explanations through videos, kinesthetic learning style learners expect interactive explanations and structured assignments biology learning is material that requires explanations Detailed so that students feel less interested in learning biology and methods, approaches, and books used as learning resources. They expect active learning and the interesting teaching materials to be associated with a more effective method and teaching materials used in the form of technology according to their learning style; (3) Based on the analysis of the literature of the textbooks used in the school by Pratiwi, et al. (2007). This book is still the standard content of KTSP 2006; (4) Concept analysis is carried out to determine the format and components of the learning e-module to be developed as well as the material contained in the textbook with the learning e-module to be developed using literature related to the research; (5) The analysis of learning objectives is oriented towards learning outcomes (CP), learning objectives (TP) and the flow of learning objectives (ATP) set out in the independent curriculum. The e-module presents clear and systematic core material integrated with student worksheets, facilitating contextual understanding. It incorporates Qur'anic verses to enhance insight, motivate students, and promote the application of biology integrated with religious values in daily life. It also supports students in expressing their ideas through discussion. Wijaya and Vidianti (2020) state that systematically developed instructional materials can aid students in comprehending the content.

Design Stage

At the design stage, it is carried out based on the development of procedures at the prototype stage of the learning e-module. (1) The creation of the Media Program Outline (GBPM) e-learning module is adjusted to the TP and ATP used in schools as shown in Table 1 ; (2) The flowchart of the learning e-module is carried out by sorting and paying attention to the relationship between learning materials such as e-module components; (3) The storyboard of the e-learning module includes an opening section which contains a preface, table of contents, a list of pictures, a list of tables and an introduction as well as for the type of writing used, namely Arimo size 13 with a space of 1.25. The core part consisting of 4 learning activities is arranged based on TP, contains STAD steps, contains material with visual, auditory and kinesthetic learning styles, and at the end has student worksheets. The concluding section has a conclusion, an evaluation test, a glossary, and a bibliography. Sartika et al. (2024) state that an e-module is a self-instructional learning material designed to achieve specific learning objectives, systematically organized and presented in electronic form, containing text, videos, audio, animations, and navigation features that enhance user interactivity; (4) Collection of relevant resources and necessary components such as images, animations, fonts obtained from the Canva application and learning style concepts that include visual, auditory and kinesthetic including learning videos. Derrydamawati et al. (2024) state that flipbook-based e-modules are compiled from accurate sources and enriched with images, videos, and animations to facilitate understanding and visualization for students. (5) This step is done by designing the module using the Canva app and converting it to the Heyzine Flipbooks website. Letters (fonts) have functional and meaning characteristics, so appropriate use is important so that meaning can be conveyed and misunderstandings. The utilization of a specific combination of colors and backgrounds is purposeful, to ensure both visual comfort and ease of readability, thereby fostering a visually appealing aesthetic that is designed to captivate the reader's interest (Asri & Dwiningsih, 2022); (6). The last is finishing. In this activity, a review was carried out.

Table 1.
Creation of Media Program Outline (GBPM)

No	Aspects	Description
1	Subject	Biology
2	Learning Objectives	Able to explain about the digestive system
3	Topics	Digestive System
4	Tools and Media	Smartphone, Markers and Whiteboards

Develop Stage

The development stage is carried out to see the validity and practicality of the product. This stage consists of two, namely the validation process for validators and a limited trial to see the practicality of the product. At the validity stage, the author validates the validation sheet for the module validity sheet, the module validity test sheet, and the validation sheet for the practicality sheet. Meanwhile, at the practicality stage, the author conducted a module practicality test with a practicality questionnaire filled out by students. In this study, there were 3 validators consisting of 2 biology lecturers and 1 biology teacher at the grade XI senior high school. After providing suggestions and input, the validator assesses the product using a validation questionnaire. The results of the feasibility assessment are in Table 2.

Table 2.
Results of the Validation Analysis of the Learning E-Module

No	Aspects	Validators			Sum	Maximum score	(%)	Category
		1	2	3				
1	Didactics	27	31	36	94	108	87	Very valid
2	Construct	78	88	104	270	312	86	Very valid
3	Linguistics	12	12	16	40	48	83	Very valid
4	Technical	24	28	32	84	96	87	Very valid
	Total	**141**	**159**	**188**	**488**	**564**	**86**	**Very valid**

Based on the results of the table, the e-module of the development has met the criteria with a very valid category, with an average validity value of 86%. The requirements for a suitable e-module to use must meet didactic requirements. In this condition, the e-module developed gets a percentage of 87% with a very valid category, which shows that the e-module developed is in accordance with the independent curriculum. Faridah et al. (2022) that the achievement of learning objectives is an impact due to the development of indicators that are not by basic competencies. The second condition is the construction condition that obtains a percentage of 86% with a very valid category. Based on the validator's assessment, it can be said that the learning e-module already has systematic and clear components. Sartika et al. (2024)stated that e-modules are self-taught materials to achieve certain learning goals, which are systematically arranged and presented in electronic form in which there is text, video, audio, animation, and navigation that make users more interactive.

The third requirement is the language requirement, which obtains a percentage of 83% with a very valid category. This learning e-module has used simple and clear sentences, the language used is by the level of development of students, in accordance with good and correct Indonesian rules, and has used the appropriate EYD. (F. R. Lestari & Purwantoyo, 2022) stated that the use of good and correct Indonesian and communicative sentences makes the material in the e-module easy to understand. The fourth condition is the technical requirement that obtains a percentage of 87% with a very valid category. The e-module already has interactive features that are easy to access and clear instructions. E. Lestari et al. (2022) stated that the use of e-modules should be friendly to the user, while every instruction and instruction provided is helpful to the user.

The second determination of the quality of the product that has been produced is by looking at the level of practicality of a product. From the results of the study, it is known that the differentiated instruction-based learning e-module with the STAD model on the material of the integrated digestive system of the Qur'an at grade XI senior high school is very practical, both based on teachers' and assessments from students through practicality sheets. The results of the practicality assessment by teachers and students are in Tables 3 and 4.

Table 3.
Results of the practicality questionnaire for learning e-modules by teachers

No	Aspects	Total	Maximum score	Percentage (%)	Category
1	Ease of use	36	36	100	Very practical
2	Efficiency in learning	8	8	100	Very practical
3	Benefit	52	52	100	Very practical
	Total	**96**	**96**	**100**	**Very practical**

Table 4.
Results of a practicality questionnaire for learning e-modules by students

No	Aspects	Total	Maximum score	Percentage (%)	Category
1	Ease of use	813	924	88	Very practical
2	Efficiency in learning	355	396	89	Very practical
3	Benefit	951	1056	90	Very practical
	Total	**2119**	**2376**	**89**	**Very practical**

Based on the table, the e-module demonstrated a practicality level of 100%, categorized as very practical. Student responses from the practicality questionnaire completed by 33 students of class XI.F.1 at senior high school showed a practicality score of 89%, also categorized as very practical. The practicality was assessed through three aspects: ease of use, learning efficiency, and benefits. In terms of ease of use, Ashari et al. (2023) emphasized that an engaging e-module should be user-friendly easily accessible, adaptable to students' needs, and written in clear, simple language. The integration of technology enhances its appeal compared to conventional materials. Features such as search menus, page hyperlinks, and media pop-ups improve interactivity, leveraging the hypermedia and hypercontent nature of e-modules (Yanuarti et al., 2022). Regarding learning efficiency, Rofiyadi and Lestari Handayani (2021) noted that interactive e-modules support more effective online teaching, making learning more efficient and goal-oriented. In terms of benefits, Kautsari et al. (2022) stated that e-modules shift the educator's role to that of a facilitator, fostering active student engagement. Additionally, Lubis et al. (2024) highlighted that e-modules integrating Qur'anic verses with the digestive system content serve as open-source tools that promote teamwork and critical thinking. The novelty of this product lies in the integration of Qur'anic content with biology topics in an interactive format. Its strengths include high interactivity, contextual learning, and religious integration, while its limitations involve technical constraints and limited access for students without sufficient digital devices. Challenges encountered during the study included inconsistent internet access and students' varying digital literacy. These were addressed by providing offline-accessible formats and conducting guided usage sessions to ensure effective utilization.

CONCLUSION

The results of the development of differentiated instruction-based learning e-modules with the STAD model on the integrated digestive system material of the Qur'an at grade XI senior high school have met the criteria, namely 86% with a very valid category, and are very practical with the results of response sheets from educators of 100% and from students of 89%. The differentiated instruction-based learning e-module with the STAD model on the Qur'anic integrated digestive system material at grade XI senior high school is used as a companion teaching material in the biology learning process, and for further researchers, it is expected to continue at the dissemination stage.

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REFERENCES

Afelia, Y. D., Utomo, A. P., & Sulistyaningsih, H. (2023). Implementasi Model Problem Based learning (PBL) Berbasis Pembelajaran Berdiferensiasi untuk Meningkatkan Keterampilan Kolaborasi pada Mata Pelajaran Biologi di Kelas X SMA. *Jurnal Biologi*, *1*(2), 1–11. https://doi.org/10.47134/biology.v1i2.1963

Akhiruddin, Sujarwo, Atmowardoyo, H., & Nurhikmah. (2020). *Belajar & Pembelajaran (Teori dan*

Implementasi) (Jusmawati, Ed.). Samudra Biru.
Alfath, A., Usman, A., & Utomo, A. P. (2023). Analisis Motivasi Belajar Siswa Dalam Implementasi Pembelajaran Berdiferensiasi. *Education Journal : Journal Educational Research and Development*, *7*(2), 132–140. https://doi.org/10.31537/ej.v7i2.1250
Annisa, N., & Darussyamsu, R. (2023). Validitas dan Praktikalitas Pengembangan Multimedia Interaktif pada Materi Sistem Koordinasi untuk Kelas XI SMA/MA. *JB&P : Jurnal Biologi Dan Pembelajarannya* , *10*(1), 49–57. https://ojs.unpkediri.ac.id/index.php/biologi
Ashari, V. R., Fatirul, A. N., & Walujo, D. A. (2023). Pengembangan E-Modul Kimia Materi Asam Basa Berbasis Flip PDF Professional untuk Peserta Didik Kelas XI SMA Negeri 1. *Edukasia: Jurnal Pendidikan Dan Pembelajaran*, *4*(2), 1391–1398. http://jurnaledukasia.org
Asri, A. S. T., & Dwiningsih, K. (2022). Validitas E-Modul Interaktif sebagai Media Pembelajaran untuk Melatih Kecerdasan Visual Spasial pada Materi Ikatan Kovalen. *Pendipa Journal of Science Education*, *6*(2), 465–473. https://doi.org/10.33369/pendipa.6.2.465-473
Bakti, I., Iriani, R., Ihdayanti, A., & Hamid, A. (2023). E-Module Development Based on Flip PDF Professional by Using Problem Solving Model in Wetland Context to Improve Stoichiometry Learning Outcomes. *Jurnal Pendidikan Sains Indonesia*, *11*(4), 740–754. https://doi.org/10.24815/jpsi.v11i4.31399
Dayanti, Z. R., Respati, R., & Gyartini, R. (2021). Pengembangan Bahan Ajar Elektronik Flipbook Dalam Pembelajaran Seni Rupa Daerah Siswa Kelas V di Sekolah Dasar. *Journal of Elementary Education*, *4*(5), 704–711. https://doi.org/10.22460/collase.v4i5.8187
Derrydamawati, C. C., Handajani, S., Purwidiani, N., & Pangesthi, L. T. (2024). Pengembangan e-Modul Berbasis Heyzine Flipbook pada Materi Peralatan Dapur untuk Siswa Kuliner Fase E. *Jurnal Ilmiah Profesi Pendidikan*, *9*(3), 1723–1730. https://doi.org/10.29303/jipp.v9i3.2501
Destiansari, E., Salsabilla, F. W., & Meilinda. (2024). Development of electronic students' worksheets based on problem-based learning on air pollution material. *Biosfer*, *17*(2), 337–349. https://doi.org/10.21009/biosferjpb.34117
Faridah, U., Rahayu, Y. S., & Dewi, S. K. (2022). Pengembangan E-Modul Interaktif Untuk Melatihkan Keterampilan Literasi Sains Siswa Materi Transpor Membran. *BioEdu: Berkala Ilmiah Pendidikan Biologi*, *11*(2), 394–404. https://ejournal.unesa.ac.id/index.php/bioedu
Himmah, F. I., & Nugraheni, N. (2023). Analisis Gaya Belajar Siswa untuk Pembelajaran Berdiferensiasi. *Jurnal Riset Pendidikan Dasar (JRPD)*, *4*(1), 31. https://doi.org/10.30595/jrpd.v4i1.16045
Jamil, M. N., Qomaria, N., Hadi, W. P., Rakhmawan, A., & Sutarja, M. C. (2022). Kelayakan Modul Ipa Materi Tata Surya Teringrasi Ayat-Ayat Al-Qur'an. *Jurnal Natural Science Educational Research*, *5*(2), 119–128. https://doi.org/10.21107/nser.v5i2.15983
Jayanti, M. A., & Pertiwi, K. R. (2023). Pengembangan e-modul berbasis pbl untuk meningkatkan kemampuan analisis dan rasa ingin tahu siswa. *JINoP (Jurnal Inovasi Pembelajaran)*, *9*(1), 112–127. https://doi.org/10.22219/jinop.v9i1.23178
Kautsari, M., Hairida, Masriani, Rasmawan, R., & Ulfah, M. (2022). Pengembangan E-Modul Berbasis Problem Based Learning pada Materi Zat Adiktif. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(6), 8116–8130. https://doi.org/10.31004/edukatif.v4i6.3850
Khastini, R. O., Hendriyani, M. E., Mahrawi, M., & Hibatullah, N. H. (2023). Digital flipbook module in circulatory system to facilitate student different intelligent and learning style. *Biosfer*, *16*(2). https://doi.org/10.21009/biosferjpb.33416
Lestari, E., Nulhakim, L., & Indah Suryani, D. (2022). Pengembangan E-modul Berbasis Flip Pdf Professional Tema Global Warming Sebagai Sumber Belajar Mandiri Siswa Kelas VII. *PENDIPA Journal of Science Education*, *6*(2), 338–345. https://doi.org/10.33369/pendipa.6.2.338-345
Lestari, F. R., & Purwantoyo, E. (2022). Pengembangan E-Modul Berbasis Flip Pdf Professional Dengan Model Experiential Jelajah Alam Sekitar Untuk Meningkatkan Pemahaman Konsep Siswa Pada Materi Plantae. *Prosiding Seminar Nasional Biologi X FMIPA Universitas Negeri Semarang*, 98–105. https://proceeding.unnes.ac.id/semnasbiologi/article/view/2753/2210
Lindawati. (2022). Pendekatan Differentiated Instruction Dalam Meningkatkan Hasil Belajar Caption Siswa Kelas XII MIPA-1 di SMAN 1 Peukan Baro. *Jurnal Real Riset*, *4*(1), 6–11. https://dx.doi.org/10.47647/jrr.v4i1.544
Lubis, S. A., Tambunan, E. P. S., & Khairuna. (2024). Pengembangan E-Modul Berbasis Stem Materi Sistem Pencernaan Manusia Terintegrasi Ayat-Ayat Al-Qur'an Kelas XI SMA. *Jurnal Bioshell*, *13*(2), 99–110.

https://Doi.Org/10.56013/Bio.V13i2.3347
Mayasari, D., Suwondo, & Darmadi. (2023). Development Of E-Module Based On Cooperative Model Stad Type On Digestive System Material In Class XI SMA. *Jom FKIP-UR*, *10*(1).
Mufida, L., Subandowo, M., & Gunawan, W. (2022). Pengembangan E-Modul Kimia Pada Materi Struktur Atom Untuk Meningkatkan Hasil Belajar. *JIPI (Jurnal Ilmiah Penelitian Dan Pembelajaran Informatika)*, *7*(1), 138–146. https://doi.org/10.29100/jipi.v7i1.2498
Nurul, N. Z. (2021). Analisis Kebutuhan Bahan Ajar Biologi untuk Siswa SMA Ditinjau dari. *Biological Science and Education Journal*, *1*(2), 128–133. http://dx.doi.org/10.30998/edubiologia.v1i2.9629
Permana, N. D., Ramadan, C. P., Syarif, M. I., Mahartika, I., Setyaningsih, R., & Wibowo, F. C. (2023). The Development of Science E-modules in Junior High Schools Integrated with Al-Qur'an Verses and Assisted by Virtual Simulations on the Subject of Vibration, Waves and Sound. *Jurnal Inovasi Pendidikan IPA*, *9*(2), 164–176. https://doi.org/10.21831/jipi.v9i2.61041
Ramadhanti, D., & Yanda, D. P. (2018). Understanding Poetry Through The Use Of Cooperative Learning Model. *Cakrawala Pendidikan*, *3*, 436–446. http://dx.doi.org/10.21831/cp.v38i3.20675
Riduwan. (2010). *Metode dan Teknis Menyusun Tesis*. Alfabeta.
Rofiyadi, Y. A., & Lestari Handayani, S. (2021). Pengembangan Aplikasi E-Modul Interaktif Berbasis Android Materi Sistem Peredaran Darah Manusia Kelas V Sekolah Dasar. *Jurnal Pendidikan Dasar Indonesia*, *6*(2), 54. http://dx.doi.org/10.26737/jpdi.v6i2.2575
Sartika, P., Elviana, & Zuhara, E. (2024). Pengembangan E-Modul Gaya Belajar. *Journal Hurriah: Journal of Educational Evaluation and Research*, *5*(2), 229–242. https://repository.ar-raniry.ac.id/id/eprint/37253
Suhaeri, & Daud, F. (2022). Pengembangan Perangkat Pembelajaran Berbasis Diferensiasi dalam Pembelajaran Biologi Pada Kelas X SMA Negeri 16 Bone. *UNM: Journal of Biological Education*, *5*(2), 1–11. https://doi.org/10.35580/ujbe.v5i2.34177
Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional Development for Training Teachers of Exceptional Children: A Sourcebook*. Center for Innovation In. (Mc).
Tomlinson, C. A. (2017). *How to Differentiate Instruction in Academically Diverse Classooms* (3rd Edition). ASCD.
Wijaya, J. E., & Vidianti, A. (2020). The Effectiveness of Using Interactive Electronic Modules on Student Learning Outcomes in Education Innovation Course. *International Conference on Progressive Education (ICOPE 2019)*, 86–89. https://doi.org/10.2991/assehr.k.200323.096
Winangsih, E., & Harahap, R. D. (2023). Analisis Penggunaan Media Pembelajaran pada Muatan IPA di Sekolah Dasar. *Jurnal Basicedu*, *7*(1), 452–461. https://doi.org/10.31004/basicedu.v7i1.4433
Yanuarti, R., Utari, I., & Harianti, D. (2022). Evaluation of E-Module Utilization as Self-directed Learning Materials in Teachers' Competency Improvement Program. *Jurnal Teknodik*, *26*, 101.
Zulfa, S. (2022). Integrasi Ayat-Ayat Al-Qur'an Dalam Pembelajaran Sains. *Nihaiyyat: Journal of Islamic Interdisciplinary Studies*, *1*(2), 141–152. https://ejournal.tmial-amien.sch.id/index.php/nihaiyyat/index