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Development of Interactive E-modules Based on Teaching at the Right Level to Improve Reading Literacy Skills

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Abstract

Reading literacy is a fundamental skill for students' subsequent learning. However, the limited availability of e-modules and varying levels of students' reading abilities present significant challenges. This study aims to develop interactive e-modules based on the Teaching at the Right Level (TaRL) approach to enhance students' reading literacy skills in the first grade at SDN Panaragan 3 Kota Bogor. The research adopts the Research and Development (R&D) method using the ADDIE model. The study's participants were five first-grade students selected through purposive sampling to represent diverse reading proficiency levels. The assessment tools included individual oral reading tests and Likert-scale validation instruments. The feasibility of the e-module was measured using percentage data from validators and users. The findings demonstrate that the TaRL-based interactive e-module is suitable for use, as validated by experts in language, content, and media with respective scores of 92.86%, 98.33%, and 97.73%. The practicality of the e-module was confirmed through user responses, obtaining scores of 91.88% from students and 94.74% from teachers. Small-scale trials revealed improvements in reading literacy, with average test scores increasing from 42.00 (baseline 1/A1) to 76.67 (intervention/B) and 90.67 (baseline 2/A2). Furthermore, the N-Gain score of 0.85 indicates a high level of effectiveness. These results suggest that the interactive e-module based on the TaRl approach is both feasible and effective in improving students' reading literacy skills, with important implications for developing teaching materials that accommodate diverse reading levels and encourage independent learning.

Keywords: Interactive E-Module, Reading Literacy Skills, Teaching at the Right Level

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Abstrak

Keterampilan literasi membaca penting sebagai fondasi dasar siswa untuk belajar tahap selanjutnya. Namun, kurang tersedianya e-modul dan beragamnya level keterampilan membaca, menjadi kendala bagi siswa untuk menguasai kemampuan ini. Oleh karena itu, penelitian ini bertujuan menghasilkan bahan ajar berupa e-modul interaktif berbasis Teaching at the Right Level (TaRL) untuk meningkatkan keterampilan literasi membaca di kelas satu di SDN Panaragan 3 Kota Bogor. Metode yang digunakan adalah Research and Development (R&D) dengan model ADDIE. Partisipan penelitian ini adalah lima siswa kelas satu yang dipilih melalui purposive sampling untuk mewakili tingkat kemampuan membaca yang beragam. Alat penilaian yang digunakan meliputi tes membaca lisan secara individu dan instrumen validasi skala Likert. Kelayakan e-modul diukur dengan menggunakan data persentase dari para validator dan pengguna. Hasil penelitian menunujukan bahwa e-modul interaktif berbasis TaRL layak digunakan. E-modul telah diuji oleh validator ahli bahasa, materi, dan media dengan masing-masing memperoleh skor 92,86%, 98,33%, dan 97,73%. E-modul juga telah diuji kepraktisannya melalui respon siswa dan guru dengan perolehan skor 91,88% dan 94,74%. Ujicoba skala kecil menunjukan peningkatan skor tes kemampuan membaca. Pada kondisi baseline 1 (A1) skor rata-rata mencapai 42,00. Pada kondisi intervensi (B) skor rata-rata mencapai 76,67 dan pada kondisi baseline 2 (A2) skor rata-rata sudah mencapai 90,67. Sementara itu, uji N-Gain menunujukan skor 0,85 dengan kategori efektivitas tinggi. Dengan demikian, dapat disimpulkan bahwa e-modul interaktif berbasis TaRL layak digunakan dan efektif dalam meningkatkan kemampuan literasi membaca dengan implikasi penting untuk mengembangkan bahan ajar yang mengakomodasi beragam tingkat membaca dan mendorong pembelajaran mandiri

Kata Kunci: E-Modul Interaktif, Keterampilan Literasi Membaca, Teaching at the Right Level

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INTRODUCTION

Indonesia's reading literacy performance, as reflected in the results of the Program for International Student Assessment (PISA) conducted by OECD, remains a cause for concern. Based on the 2022 PISA results (OECD, 2023), Indonesia achieved a reading literacy score of 359, indicating a notable decline compared to previous assessments. Over the past decade, the average decline has reached 42.1 points, positioning Indonesia among the lower-performing countries in this domain. These findings highlight the urgent need for greater attention to reading literacy, particularly through strategic interventions by the government and the pivotal role of teachers in enhancing students' reading competencies.

In schools, students' reading literacy skills serve as a fundamental determinant of learning success. These skills enable students to comprehend, analyse, and interpret various instructional materials and information, thereby facilitating their participation in the learning process. Conversely, students who lack reading literacy skills are likely to face significant challenges in keeping up with lessons. Thus, reading literacy forms the essential foundation for students to progress in their education. It is consistent with the assertion by Ahyar et al. (2023), who emphasise that reading literacy is a core competency that every student must possess, as the absence of such skills can hinder their ability to learn effectively.

Reading literacy skills have a positive impact on students' academic performance. Individuals with strong reading literacy tend to demonstrate improvements in educational achievement, as reading serves as a gateway to acquiring knowledge. Mastery of reading skills enables students to explore a wide range of topics, expand their knowledge, and extract information or messages embedded in texts (Gustiawati et al., 2020). This is supported by a study conducted by Amri & Rochmah (2021), which found a significant correlation of 5.4% between reading literacy skills and student academic achievement. Similarly, research by Karyati (2021) confirmed that students' reading abilities positively influence their academic performance, indicating that the better the students' reading skills are, the higher their academic achievements tend to be.

Furthermore, reading also fosters students' critical thinking skills. Literacy activities enable students to discover problem-solving strategies, thereby enhancing their ability to analyse issues critically. As a result, students are more likely to develop a critical thinking mindset. In line with this, Mualimah et al. (2018) stated that reading can cultivate students' critical thinking abilities, as it allows them to process information from text and connect it with prior knowledge. This view is further supported by Oktariani & Ekadiansyah (2020), who emphasise that reading literacy plays a significant role in the development of critical thinking skills. Similarly, Rohman's (2022) study highlights that a strong literacy culture significantly contributes to improving students' capacity for critical thinking. The higher the level of students' literacy, the greater their ability to think critically.

In recent years, the trend in digital learning has shifted significantly, with interactive e-modules emerging as a key tool for enhancing literacy skills beyond traditional supplementary materials. This pedagogical change leverages technology not just as a teaching aid, but as a powerful medium for differentiated learning, enabling educators to tailor content to individual student needs and diverse reading levels. The integration of multimedia elements such as audio, video, and interactive quizzes within e-modules allows for a more dynamic and engaging learning experience (Hanatan et al., 2023), which has been shown to boost student motivation and independence (Khulaifiyah et al., 2022; Sholeh et al., 2023). This approach aligns with modern educational frameworks that emphasise student autonomy and personalised learning paths (Sholeh et al., 2023), addressing the limitations of one-size-fits-all printed materials. By transforming static text into a rich, adaptive environment, interactive e-modules effectively support the development of reading comprehension and critical thinking, offering a robust solution to the persistent challenges of literacy education in a diverse classroom setting (Rahmawati & Fajri, 2023; Sape et al., 2024).

In addition, an initial reading assessment conducted by the first-grade teacher of SDN

Panaragan 3 Kota Bogor using an adapted version of the Pratama early reading assessment revealed that students possessed varying levels of reading literacy. Approximately 15% of students had not yet recognised letters or had only recognised a few. Around 20% were generally familiar with letters and able to sound out syllables composed of two-letter combinations. Another 20% could read some words but were not yet fluent. Meanwhile, 40% of students were able to read fluently, and 5% could read longer texts with varying degrees of comprehension. These findings are consistent with previous studies by Rizkiana (2016) and Nurani et al. (2021). This diversity in literacy levels presents a particular challenge for educators in ensuring that the learning process is effective for all students in the classroom (Harmain et al. 2023).

An analysis of one of the teaching materials used by the first-grade teacher at SDN Panaragan 3 Kota Bogor, namely the Bahasa Indonesia textbook for Grade 1 SD/MI published by the Ministry of Education and Culture under the Merdeka Curriculum, reveals that the material does not fully accommodate the diverse levels of students' reading literacy skills. Although the textbook is designed to support the development of reading skills in accordance with the cognitive development of first-grade students, it may pose challenges for students who have already achieved reading fluency. These students tend to experience boredom, as the content is perceived as too easy. Conversely, other teaching materials include reading texts that assume students have already attained fluency, which can create learning difficulties for students whose early reading skills are still limited.

Based on the issues described above, a viable solution is the use of reading materials that are aligned with students' developmental stage and reading proficiency levels. Given the wide range of students' reading abilities, instructional materials should be designed to accommodate these varying levels. One such approach is using teaching materials based on the Teaching at the Right Level (TaRL) framework, which is specifically designed to address diverse learning needs and support students according to their actual level of reading proficiency.

The TaRL approach is an instructional learning strategy that groups students based on their proficiency levels, thereby enabling teachers to deliver instructions tailored to the specific learning needs of each group (Hadiawati et al., 2024). One of the key strengths of this approach lies in its proven effectiveness in improving reading skills, as it allows teachers to focus on the distinct needs of each ability level (Banerjee et al., 2016; Susanti, 2024).

The use of digital-based instructional materials offers an alternative solution for improving reading literacy skills. Such material is the interactive e-module. An interactive e-module is a digital learning resource that presents content through a combination of text, images, audio, and video (Hanatan et al., 2023). To be compelling, engaging, and user-friendly, e-modules must meet specific criteria related to content quality, instructional design, and media integration. The use of e-module has been shown to enhance students' learning motivation, academic achievement, and learning independence. Moreover, it allows for flexible learning that can take place anytime and anywhere (Khulaifiyah et al., 2022).

Previous studies on the use of the TaRL approach and interactive e-modules to enhance reading literacy include research by Ahyar et al. (2022), which demonstrated that implementing the TaRL instructional model in early grade reading literacy at SDN Inpres Tolotangga led to improvements in students' reading abilities. This study provides empirical evidence that the TaRL approach can effectively enhance students' reading literacy skills.

Previous studies have proven the effectiveness of the Teaching at the Right Level (TaRL) approach and the use of interactive e-modules in improving reading literacy. Research by Ahyar et al. (2022) and Harmain et al. (2023) demonstrated that implementing the TaRL instructional model and using TaRL-based teaching materials significantly improved the reading skills of elementary school students. These findings provide strong empirical evidence that the TaRL approach can effectively enhance

students' reading literacy. Similarly, Syaputra et al. (2024) found that an interactive e-module developed using a Flipbook format demonstrated high levels of validity, practicality, and effectiveness, potentially enhancing student motivation and comprehension during reading activities. In line with this, English e-modules have also been developed to promote reading comprehension skills (Utami et al., 2024).

Utilising an interactive e-module based on the TaRL approach is a highly relevant solution for addressing the diverse reading levels found among students, as it effectively integrates the principles of constructivism, specifically the concept of the Zone of Proximal Development (ZPD). This theory posits that the most effective learning occurs when instruction is adapted to a student's ability, with appropriate guidance or "scaffolding" (Riany et al., 2024). Interactive e-modules, with features like audio, video, and quizzes, function as digital scaffolding, enabling each student to learn at their own pace without waiting for others (Purnawanto, 2023). Unlike conventional printed books, which are uniform and passive, the digital format offers crucial advantages: interactivity, personalisation, and adaptability. Interactivity can boost student motivation, while audio and video features help students with stronger auditory and visual learning styles. Personalisation allows students to choose their learning path based on their needs, and adaptability enables teachers to adjust materials quickly. The e-module also fosters student independence, which is vital for cultivating autonomy in the learning process. Thus, the interactive e-module is not merely a tool but an adaptive learning medium that fundamentally supports the implementation of TaRL to improve reading literacy effectively (Khulaifiyah et al., 2022; Sholeh et al., 2023).

While these studies have demonstrated the potential of each approach, a significant research gap remains: no research has explicitly integrated both approaches into a single product, such as an interactive e-module based on TaRL, to comprehensively address the diversity of students' reading levels. Previous studies have tended to focus on either TaRL as a teaching approach or e-modules as a medium separately. Therefore, this study aims to fill that gap by developing and testing a teaching material that combines the principles of TaRL differentiation within an interactive e-module format. This approach goes beyond merely replicating previous findings, providing a new, more comprehensive solution to the persistent challenges of reading literacy.

METHODS

This study employed the Research and Development (R&D) method, utilising the ADDIE model, which consists of five phases: Analyze, Design, Development, Implementation, and Evaluation (Okpatrioka, 2023). The subjects of this study were five first-grade students at SD Negeri Panaragan 3, Kota Bogor, selected through purposive sampling. This technique was chosen to ensure the sample represented diverse reading ability levels, which is a key characteristic of the target user group for this instructional product. The choice of a small sample size (n=5) is a deliberate aspect of the R&D methodology, which prioritises the in-depth development and refinement of a product over broad statistical generalisation. Prior to data collection, written consent was obtained from the school administration and the parents of the student participants to ensure ethical research conduct.

Data were collected using both qualitative and quantitative methods through semi-structured interviews, questionnaires, and tests. The interviews were conducted with the first-grade teacher to identify needs related to reading instructional materials. The questionnaires, designed using a Likert scale, served to gather feedback from expert validators (in language, media, and content) and users (teachers and students) on the e-module's feasibility and practicality. The expert validation instruments were designed to measure the e-module's feasibility based on indicators such as content alignment with learning outcomes, media attractiveness, and language clarity. These instruments underwent expert validation to ensure their reliability and validity before the implementation phase. Quantitative data were also derived from pre-tests and post-tests to measure students' reading ability.

The implementation phase employed a single-subject research design with an A-B-A'

framework: Baseline 1 (A1), Intervention (B), and Baseline 2 (A2). This design was chosen to directly observe the effect of the e-module intervention on the same group of students over time, which is suitable for the developmental nature of this R&D study. In the A1 and A2 phases, a reading ability test was administered without intervention, while the B phase involved using the developed e-module as the primary teaching material. The data from these tests were analysed using descriptive statistics to show changes in average scores and Normalized Gain (N-Gain) analysis to determine the effectiveness of the e-module in improving reading literacy skills. The N-Gain score was calculated by comparing pre-test scores (A1) and post-test scores (A2) to measure the magnitude of improvement. The data analysis served as a reference for product revision and improvement.

RESULTS AND DISCUSSION

The development of the TaRL-based interactive e-module aimed at improving reading literacy skills was carried out through five stages: Analyze, Design, Development, Implementation, and Evaluation. These stages are aligned with the ADDIE model applied in this study. The results of each development stage of the interactive e-module are as follows.

Analyze Stage

The initial stage involved gathering information through a field study conducted in a first-grade classroom at SDN Panaragan 3, Kota Bogor, through interviews and observations. Interviews were conducted with the first-grade teacher to identify needs related to reading instructional materials. At the same time, observations were used to analyse the current reading materials, the content of reading instruction, and students' initial reading abilities.

The interview results revealed that the teacher had never used digital or electronic books as teaching materials. The instructional materials used thus far were limited to printed textbooks. The main challenges faced by the teacher included the limited availability of printed materials and their lack of appeal to students when compared to digital books. Additionally, the printed materials were considered insufficiently interactive, requiring complete teacher guidance, particularly for students with low reading proficiency.

Subsequently, the researcher analysed the reading instructional content. The primary source used by the teacher was a textbook published by the Ministry of Education, Culture, Research and Technology's Book Center. The subject analysed was Bahasa Indonesia for Grade 1 (Phase A). Based on the analysis, the learning materials were aligned with the latest Learning Outcomes, specifically the Decree of the Head of the Curriculum, Assessment, and Education Standards Agency (BSKAP) Number 032/H/KR/2024, which concerns Learning Outcomes in Early Childhood Education, Basic Education, and Secondary Education within the Merdeka Curriculum framework. However, the content in this textbook assumes that all students have the same level of reading proficiency. In contrast, first-grade students demonstrate varied levels of reading ability. Consequently, it becomes difficult for students to engage with materials that require a uniform level of reading comprehension.

Students' reading proficiency also became an essential focus of analysis in this study. To validate the interview findings, the researchers conducted individual diagnostic assessments of 25 first-grade students at the school. This diagnostic assessment took the form of individual reading tests, which categorised students into five reading levels: letter recognition, syllable recognition, word recognition, paragraph reading, and story reading.

The assessment results showed significant diversity in reading literacy levels among students, which were categorised into five levels. Documented evidence shows that a group of students did not yet recognise letters, could spell syllables, could read a few words but were not yet fluent, could read fluently, and could read long texts with comprehension. These findings reinforce the urgency of developing teaching materials that can accommodate the diversity of students' reading abilities.

Design Stage

The design phase was directly informed by the needs identified during the analysis stage. The findings revealed a significant gap: students have varied reading proficiency levels, yet the available materials are limited to non-interactive, printed textbooks that assume a uniform ability. To address these issues, the researcher planned the development of a TaRL-based interactive e-module. Several activities were undertaken in designing the e-module, including: adapting learning objectives, developing instructional scenarios, designing assessment and evaluation instruments, and structuring the e-module systematically.

The learning objectives were modified from the standard curriculum to align with the diverse reading levels observed in the diagnostic assessment. For example, objectives were differentiated to include recognising letters, reading syllables, and comprehending stories. This was a direct response to the wide range of student abilities documented in the previous stage.

The modification of learning objectives served as a foundation in developing the TaRL-based e-module. This e-module contains reading instructions and materials tailored to the students' varying needs and abilities. Therefore, material adaptation is essential. Before modifying the content, the teacher first revised the Learning Objectives (TP). The adapted learning objectives are as follows: 1) Students are able to recognize and pronounce letters accurately; 2) Students are able to read syllables with correct pronunciation; 3) Students are able to read words correctly; 4) Students are able to read short sentences with appropriate intonation; 5) Students are able to understand the content of the stories they read.

Furthermore, the researcher developed an assessment instrument consisting of 10 multiple-choice items. Each reading proficiency level letter, syllable, word, paragraph, and story was assigned its own set of questions to measure students' abilities appropriately. In addition, the researcher designed a validation instrument to evaluate the feasibility of the developed TaRL-based interactive e-module. Three validation instruments were prepared: media feasibility validation, content feasibility validation, and language feasibility validation.

The choice to develop an electronic module was a strategic decision to overcome the limitations of printed textbooks, as highlighted by the teacher's feedback. An interactive e-module was chosen for its ability to integrate dynamic elements such as audio, video, and interactive quizzes, which can enhance student motivation and learning independence. This approach also provides a seamless platform for implementing the TaRL framework, allowing instructional content to be personalised and delivered at the right level for each student.

The e-module was designed to be systematic and user-friendly, featuring a TaRL-based interactive format with three main sections: an introduction with a user guide, a content section covering different reading levels, and a concluding section with references and appendices. Assessment instruments were also designed to align with the modified learning objectives and validate the e-module's feasibility in terms of media, content, and language.

Furthermore, the features of the e-module facilitate the core principles of the TaRL approach. Each section is equipped with interactive elements such as videos, audio buttons, practice questions, and feedback forms. These features serve as digital scaffolding, providing targeted support that is crucial for students learning at their specific level. The personalised and adaptive nature of these features overcomes the limitations of static printed materials, as they empower students to learn independently and at their own pace. The assessment instruments were also designed to align with the modified learning objectives and validate the e-module's feasibility in terms of media, content, and language.

Development Stage

At this stage, the researcher began developing the TaRL-based interactive e-module using Canva and Plif PDF Corporate Edition. The initial design of the interactive e-module was created using Canva. Various features provided by Canva were utilised to design the cover and the layout of each page. Elements such as text, images, photos, font

colours, and background colours were determined and arranged during this process. Upon completion, the e-module was exported and saved in PDF format.

The next step involved enhancing the PDF version of the e-module using Flip PDF Corporate Edition. The process began by uploading the PDF file into the Flip PDF application. The researcher then edited the file using the available features to integrate interactive components such as videos, audio files, a home button, internal page links, evaluation quizzes, and feedback forms. The final step was to publish the e-module as a shareable link. The developed interactive e-module can be accessed via the following link: https://online.flipbuilder.com/vbnpc/bzaw/

The interface of the TaRL-based interactive e-module is illustrated in the following figures.

Figure 1. Interface of the TaRL-Based Interactive E-Module

Figure 1 illustrates several components of the TaRL-based interactive e-module. Section number 1 displays the cover page of the e-module. The cover features an image of a child reading, with a background of bookshelves filled with books, symbolising that the module serves as instructional reading material. Around the child's image, various letters and animal illustrations are scattered, reflecting the contents of one of the module's topics. Section number 2 presents the user guide for the e-module, which is intended for both teachers and students. A video tutorial also accompanies this guide on how to use the e-module. Sections 3 through 7 represent the introductory displays for each reading ability level, including letters, syllables, words, paragraphs, and stories. These sections are equipped with illustrative images and audio buttons to help students easily understand the materials. Section number 8 shows a video component embedded within each topic, consisting of educational songs designed to reinforce the material and serve as a form of ice breaking. Section number 9 contains the practice questions and feedback forms provided at the end of each topic. Students are encouraged to complete these after finishing each section of the material.

This e-module is specifically designed to include features that support the TaRL principle. Each section of the e-module, tailored to different reading levels, includes audio for pronunciation assistance, videos for material reinforcement, icebreakers, and interactive quizzes at the end of each topic to independently evaluate students' understanding. Hyperlinks have also been added for easy navigation between different sections, allowing students to directly access material appropriate to their level.

After development, the e-module was validated by three experts with different areas of expertise: a media expert, a language expert, and a subject matter expert. The validation questionnaire was developed using assessment criteria based on instructional design theory and interactive learning media to ensure the product's suitability, reliability, and validity. This validation was a crucial step to ensure that the developed product was suitable for use before being tested. The results of the validation process were analysed using a Likert scale with a score range of 1 to 4, representing the categories: very poor, poor, good, and very good. The following sections present the validation results from the experts.

Table 1. Language Expert Validation

No	Indicator	Score
1.	Sentences adhere to the rules of standard Indonesian grammar	4
2.	Sentence structure is easy to understand	4
3.	Word choices are appropriate to the subject matter	3
4.	Sentences are communicative	4
5.	The language used is polite	4
6.	Language is easy to comprehend	4
7.	Content is capable of motivating students	4
8.	Instructions are easy to follow	3
9.	Promotes students' curiosity	4
10.	Availability of feedback	4
11.	Font type is easy to read	3
12.	Font size is proportional	4
13.	Text colour contrasts with the background	4
14.	Text layout is neat and well-structured	3
Sum		52
Percentage (%)		92.86

Based on Table 1, the TaRL-based interactive e-module was rated as good in terms of word/terminology selection. The words and terms used were appropriate and contextually relevant to the learning material. The usage instructions were also rated as good because they were easy to understand. The typography in the e-module was considered adequate, featuring a clear, legible font and a neat, proportional text layout. Moreover, the use of proportional fonts and contrasting text colours against the background was rated as excellent. In addition, the module received excellent ratings for sentence construction. The sentences used were in accordance with the Enhanced Indonesian Spelling System (EBI), had clear and comprehensible structures appropriate to students' comprehension levels, and utilised polite and ethically appropriate language. The e-module was also found to be highly effective in motivating students and fostering their curiosity. The total score achieved was 92.86%, which falls into the "excellent" category and indicates that no revisions were required. Therefore, based on the validation by the language expert, the TaRL-based interactive e-module is considered suitable for use as a reading instructional material.

The following section presents the validation results from the media expert.

Table 2. Media Expert Validation

No	Indicator	Score
1.	Attractiveness of the front cover	4
2.	Consistency between the visual appearance and the content	
3.	Appropriateness of background selection	3
4.	Harmony of colour composition	4
5.	Relevance of images to the material	4
6.	Visual appeal of images	4
7.	Colour coordination of images	4
8.	Accuracy of image placement	4
9.	Alignment of video content with the material	4
10.	Audio/video quality	4
11.	Accuracy of text placement	4
12.	Ease of use of navigation	4
13.	Consistency of navigation button design	4
14.	Ease of interaction with media	4
15.	Availability of interactive feedback	4
Sum		59
Percentage (%)		98.33

Table 2 shows that the interactive TaRL-based e-module was rated positively for its background selection, which provides sufficient contrast with both text and images. In addition, this module received an excellent rating for its cover design. The cover is visually appealing, reflects the content of the e-module, and features a harmonious colour composition. The use of illustrative images was also rated very highly. The images are relevant to the material, the colours are well-coordinated with other visual elements, and the placement is appropriate.

Furthermore, the navigation system is user-friendly, facilitating interaction between users and the e-module. The feedback feature within the e-module was also considered interactive and practical. The overall score achieved was 98.33%, falling into the

"excellent" category, with no revisions required. Therefore, based on the media expert validation, the interactive TaRL-based e-module is deemed suitable for use as a reading instructional material.

The next stage is content expert validation. The results of the content expert validation are presented in the following table.

Table 3. Content Expert Validation

No	Indicator	Score
1.	Alignment of content with learning outcomes	4
2.	Content relevance to students' characteristics in the TaRL approach	3
3.	Content supports the development of reading skills	4
4.	Exercises are appropriate for students' reading ability levels	4
5	Reading texts match the students' reading proficiency levels	4
6.	Content facilitates differentiation based on reading ability levels	4
7.	Learning activities align with the "right level" principle	4
8.	Scaffolding strategies are provided	4
9.	Content allows students to learn at their own individual pace	4
10.	Evaluations are aligned with the content	4
11.	Feedback is aligned with the content	4
Sum		43
Percentage (%)		97.73

Based on Table 3, it can be concluded that the content in the TaRL-based interactive e-module is rated as excellent. The material presented aligns with the Learning Outcomes outlined in the Merdeka Curriculum. The content is designed to support the development of students' reading skills, with examples and exercises tailored to their reading proficiency levels. The selected reading texts are also appropriate for students' individual reading levels. However, the depth of content concerning student characteristics under the TaRL approach is rated as good.

In addition, the implementation of the TaRL approach within the e-module is rated very highly. Differentiation based on students' reading abilities has been accommodated through the materials provided. The learning activities support the principle of "right level" adjustment. Moreover, the e-module incorporates scaffolding strategies to enhance reading development. The materials also allow students to learn at their own pace.

Furthermore, the assessments and feedback provided are aligned with the content. The total score obtained from the expert validation is 97.73%, classified as "very good" with no revisions required. Therefore, based on the validation by the subject matter expert, the TaRL-based interactive e-module is deemed appropriate for use as reading instructional material.

Although this e-module is designed for independent use, challenges related to students' unfamiliarity with computers have been identified. Therefore, the e-module interface has been made as intuitive and straightforward as possible with clear buttons and visual guides. Nevertheless, it is recommended that teachers provide a basic introduction to computer operation before students use the e-module to its full extent. This development process is iterative, with feedback from small trials used as the basis for product revisions and improvements.

Implementation Stage

After the feasibility of the TaRL-based interactive e-module was validated by experts, the e-module was subsequently implemented in the teaching process as instructional material for reading. The implementation was carried out with five students who had varying levels of reading ability. In this study, implementation was divided into three phases: baseline 1 (A1), intervention (B), and baseline 2 (A2). Each phase consisted of 3 sessions.

1. Baseline 1 (A1)

In this phase, a reading ability test was administered by assigning students a set of questions, without any treatment involving the use of the TaRL-based interactive e-module. This stage phase was conducted over three sessions, with each session lasting 2x30 minutes. The test consisted of five levels, each comprising ten questions.

2. Intervention (B)

The next phase was the intervention phase (B). In this phase, the researcher implemented an intervention by using the developed TaRL-based interactive e-module

as reading instructional material. This phase was also conducted over three sessions, each lasting 2 x 30 minutes. At the end of each session, students were given 10 questions tailored to their respective reading proficiency level.

3. Baseline 2 (A2)

In this final phase, a post-intervention reading test was administered to assess students' reading ability after the implementation of the TaRL-based interactive e-module. Similar to the previous phases, this phase was carried out over three sessions, each lasting 2 x 30 minutes. The test consisted of five levels, each containing 10 questions.

The following is the summary of students' reading test results across the baseline 1, intervention, and baseline 2 phases.

Table 4. Recapitulation of Reading Ability Test Results

Student	Baseline 1			Intervention			Baseline 2		
	1	2	3	4	5	6	7	8	9
S1	50	30	30	60	100	90	90	90	90
S2	20	30	20	60	80	80	80	80	80
S3	50	30	30	30	70	80	90	90	90
S4	50	80	40	90	100	100	100	100	100
S5	70	50	50	50	80	80	90	90	100
Average	48	44	43	58	86	86	90	90	92
Average/ Condition	42.00			76.67			90.67		

Based on Table 4, the reading ability test scores of students during the baseline 1 (A1) condition indicated relatively low performance. During the intervention phase, there was a noticeable improvement in scores, which continued to increase in the baseline 2 (A2) condition. A visual representation of the improvement in students' reading test scores is presented in the following graph.

The graph in Figure 2 illustrates the progression of students' reading test scores. During baseline 1 (A1), the graph fluctuates but shows a downward trend, indicating that students' reading ability was still relatively low. However, during the intervention phase (B), the graph demonstrates a consistent upward trend, which continues to stabilise during baseline 2 (A2). It indicates an improvement in reading ability between the pre-intervention and post-intervention phases, achieved through the implementation of the interactive e-module based on the TaRL (Teaching at the Right Level) approach.

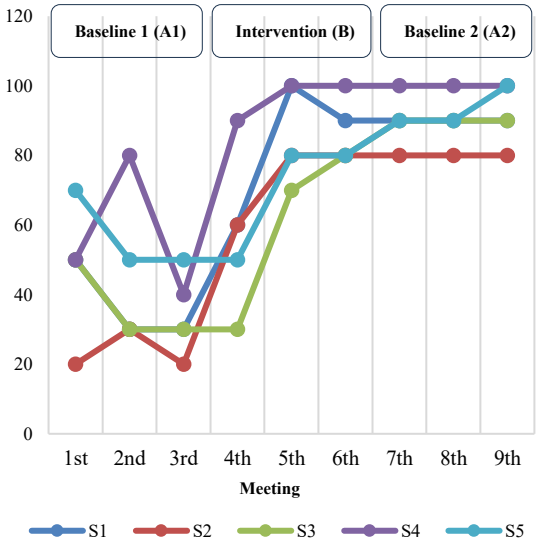

Figure 2. Graph of Reading Ability Test Score Improvement

The effectiveness of the e-module was assessed by comparing students' reading test scores across the three phases. The average score increased from 42.00 (phase A1) to 76.67 (phase B) and reached 90.67 (phase A2).

In addition, the effectiveness of the product was also measured using Normalized Gain (N-Gain) from the pre-test (A1) and post-test (A2) results. The N-Gain analysis was performed using the Statistical Product and Service Solutions (SPSS) application. The results of the N-Gain test are presented in the following table.

Table 5. N-Gain Test Results

	N	Min	Max	Mean	Std. Deviation
N-Gain	5	.74	1.00	.8520	.09333
Valid N (listwise)	5				

Based on the N-Gain calculation results shown in Table 5, the N-Gain score obtained was 0.85. According to the criteria for interpreting N-Gain values, this score is classified as high, since N-Gain $\geq$ 0.7. Therefore, it can be concluded that the

interactive e-module based on the TaRL approach is effective in improving students' reading skills.

An N-Gain score of 0.85 indicates high effectiveness. However, it should be acknowledged that due to the very small sample size (n=5), these findings cannot be generalised. Additional statistical tests, such as significance tests, were not performed because the research design focused more on product development and changes in individuals. This study also did not include a long-term follow-up to measure students' reading skill retention after the intervention ended.

Following the implementation of the interactive TaRL-based e-module, a practicality test was conducted involving both teachers and students. The aim was to evaluate the ease of use and practicality of the e-module in actual learning settings. The practicality test was conducted by collecting responses from both teachers and students regarding the use of the e-module. The following table presents the teacher's responses.

Table 6. Teachers' Responses to E-Modules

No	Indicator	Average Score
1.	The e-module has an attractive design	3
2.	Colour use does not distract students' concentration.	4
3.	Layout is neat and well-structured.	3
4.	Images and illustrations are of good quality.	4
5.	Videos effectively support the material.	3
6.	Content aligns with the learning objectives.	4
7.	Material is appropriate for students' proficiency levels.	4
8.	The presentation flow is systematic.	4
9.	Interactive activities motivate students.	4
10.	Feedback is clear and constructive.	3
11.	The module aligns with the TaRL approach.	4
12.	Navigation is easy to use.	4
13.	The module is accessible and user-friendly.	4
14.	Instructions are clear and understandable.	4
15.	Supports independent learning	4
16.	Font size and type are easy to read.	4
17.	Enhances students' reading ability.	4
18.	Encourages learner autonomy.	4
19.	Creates a fun learning experience	4
Sum		72
Percentage (%)		94.74

Based on the teacher responses presented in Table 6, the interactive e-module based on the TaRL approach is rated as highly effective in terms of usability, readability, and instructional benefits. However, the aspects of design, layout, video, and feedback are rated as good. The overall score achieved is 94.74%. According to the categorisation of practicality levels, this score places the e-module in the "very practical" category. Therefore, it can be concluded that the e-module is highly practical for classroom use, as indicated by teacher responses.

Table 7. Student Responses to the E-Module

No	Indicator	Average Score
1.	The images displayed are visually pleasing.	4
2.	The videos in the module are highly engaging.	3.2
3.	Audio quality is clear and easy to understand.	3.6
4.	The colour scheme is bright and attractive.	3.4
5.	The module has an appealing overall appearance.	4
6.	The reading exercises are enjoyable.	3.8
7.	The module offers a wide selection of reading texts.	3.6
8.	I can choose which reading text I want to read.	3.4
9.	The instructions provided in the module are very clear.	3.8
10.	I find the module easy to use.	38
11.	The text in the module is clearly visible.	3.8
12.	I am interested in reading the module.	3.6

13.	I am motivated to learn to read through this module.	3.8
14.	I enjoy learning to read using this module.	3.8
15.	I can learn to read independently using this module.	3.2
16.	I am able to read with the help of this module.	4
Sum		58.80
Percentage (%)		91.88

Based on Table 7, the majority of students showed interest in the visual appearance and presentation of the e-module. In addition, students reported ease of use when interacting with the e-module. They did not encounter difficulties in reading the content as the text was clearly visible. Students also perceived benefits from using the e-module. As a result, the average score of student responses reached 91.88%. According to the practicality level category, this score falls into the "very practical" category. Thus, it can be concluded that the e-module is highly practical for student use, as indicated by their responses.

Evaluation Stage

The evaluation stage is the final and most crucial phase in the research and development process, synthesising findings from all previous stages to determine the final product's quality and effectiveness. The decision on the e-module's feasibility was based on data from expert validation, user practicality, and its impact on student learning outcomes.

Based on the expert validation, the e-module was deemed highly valid and suitable for use. Scores from language (92.86%), content (98.33%), and media experts (97.73%) all fell within the "excellent" category, indicating that no major revisions were required. This validation confirmed that the e-module was theoretically sound and well-designed before its implementation.

Furthermore, the practicality of the e-module was confirmed by the responses from teachers and students, with scores of 94.74% and 91.88%, respectively. These high scores, categorised as "very practical," demonstrate that the e-module is user-friendly and highly usable in a real-world classroom setting.

Most importantly, the effectiveness of the e-module was conclusively proven by the improvement in students' reading test scores. The average score increased from 42.00 in the pre-intervention phase to 90.67 in the post-intervention phase. The high Normalized Gain (N-Gain) score of 0.85 further validated that the e-module was highly effective in improving students' reading literacy skills.

In conclusion, the evaluation stage provides definitive evidence that the TaRL-based interactive e-module is a viable and effective solution. The seamless alignment of high validity, practicality, and effectiveness allows the researchers to confidently conclude that the developed e-module is an appropriate and valuable teaching resource for enhancing reading literacy.

Discussion

The initial stage of this research involved needs analysis through diagnostic assessments conducted on students. These assessments revealed significant diversity in students' reading literacy levels (Rachmawati & Lestariningrum, 2022), which formed the basis for the design of the e-module. As a result, the e-module was designed to overcome the challenges posed by conventional teaching materials that could not accommodate these differences. Therefore, this e-module was developed with interactive multimedia features, such as video and audio, which function as digital scaffolding and support independent learning (Irmansyah, 2024). This interactive e-module not only offers customised content but also provides a more engaging way of learning, unlike printed textbooks, which are less interactive and monotonous (Ayu et al., 2023).

The interactive e-module based on the Teaching at the Right Level (TaRL) approach was developed with an engaging design to enhance students' reading literacy skills. Based on the results of the student response questionnaire, students showed a high level of interest in the e-module, which increased their motivation to learn to read. This finding aligns with the study by Sunarya et al. (2025), which found that interactive e-modules simultaneously influence students' motivation and learning outcomes. According to Nurrita (2018), attractive learning media can stimulate

student engagement in the learning process. Similarly, attractive media can enhance both student motivation and learning activity (Nadia & Desyandri, 2022). The finding that learning materials influence reading motivation is also supported by recent research (Ismayani et al., 2025).

The content in the TaRL-based interactive e-module was designed to accommodate students' diverse levels of reading ability, which aligns with the concept of differentiated learning. Riany et al. (2024) reported that differentiated instruction has a significant impact on students' reading and writing outcomes. In addition, the e-module features interactive elements such as audio, video, quizzes, and hyperlinks, allowing students to learn independently. This finding supports Sholeh et al. (2023), who found that interactive e-modules encourage student autonomy in learning.

The effectiveness and practicality of TaRL-based interactive e-modules have been proven to be consistent with previous research on digital learning media. Expert validation shows that this product is highly feasible and valid, with high scores from language experts (92.86%), subject matter experts (98.33%), and media experts (97.73%). These findings are in line with research highlighting the importance of media validity as a prerequisite for classroom use (Syaputra et al., 2024). The practicality of the e-module was also confirmed through positive responses from teachers (94.74%) and students (91.88%), reinforcing the evidence that engaging and easy-to-use media can increase student motivation and learning independence (Sholeh et al., 2023). The integration of interactive elements such as videos, audio, and quizzes in e-modules effectively overcomes the limitations of printed teaching materials (Rahmawati & Fajri, 2023), thereby creating a more dynamic and personalised learning environment (Hanatan et al., 2023). Thus, these findings not only confirm the product's feasibility but also synthesise evidence that the combination of valid design, practicality, and interactive features is key to the successful implementation of digital learning media.

The results of this study convincingly show that TaRL-based interactive e-modules are highly effective in improving students' reading literacy skills, as evidenced by a significant increase in their test scores. Through single-subject analysis, the average score increased from 42.00 (baseline condition) to 90.67 (post-intervention condition), showing a clear and sustained upward trend. This improvement is supported by a Normalized Gain (N-Gain) value of 0.85, which falls into the high effectiveness category. These findings are consistent with existing literature, which also reports that e-modules can improve students' reading literacy and significantly improve literacy skills in general (Rahmawati & Fajri, 2023; Sape et al., 2024). In addition, the effectiveness of TaRL as a learning approach has also been proven in other studies. These interactive e-modules, with their ability to adapt to individual ability levels and encourage independence, prove their essential role as an effective tool in differentiated learning. These findings reaffirm that combining the right pedagogical approach (Teaching at the Right Level) and interactive technology produces a powerful and impactful solution to address literacy challenges. Thus, this study not only confirms previous findings but also provides empirical evidence of how this combination can effectively promote literacy improvement (Susanti, 2024; Zhafirah et al., 2021).

This study fills an essential gap in the previously unexplored literature by synthesising the Teaching at the Right Level (TaRL) approach and the interactive e-module format into a comprehensive solution. Although previous studies have proven the effectiveness of TaRL in improving reading skills and the suitability of e-modules as a learning medium, these two approaches are often studied separately (Hanatan et al., 2023; Rahmawati & Fajri, 2023; Sape et al., 2024; Sholeh et al., 2023). The interactive e-module developed in this study addresses fundamental problems identified in the field—significant diversity in students' reading levels and limitations of printed teaching materials—by providing a platform that explicitly accommodates differentiated learning (Ahmad et al., 2024; Ismaniati & Iskhamdhanah, 2023; Kao et al., 2016; Troseth & Strouse, 2017). The main contribution of this study lies in this innovation, namely the systematic integration of TaRL principles into adaptive and

personalised digital media. Thus, these e-modules serve not only as tools but also as pedagogical mechanisms, enabling teachers to provide targeted support to each student and thereby creating a more effective and inclusive learning environment.

This research offers a unique contribution by developing a practical and validated model for creating adaptive teaching materials that effectively integrate proven pedagogical approaches, rather than focusing on just one aspect (TaRL or e-modules). This study combines the two into a coherent solution, providing a blueprint for the development of future educational products. Thus, this research positions itself at the intersection of pedagogical innovation and educational technology, clearly demonstrating how technology can be leveraged to implement proven instructional strategies (TaRL) in a more effective and personalised manner. This contribution is important because it directly addresses fundamental problems identified in the field, namely the diversity of students' reading levels and the limitations of conventional printed books, which often cannot accommodate diverse learning needs (Harmain et al., 2023; Riany et al., 2024; Sholeh et al., 2023).

Based on the research findings, the developed TaRL-based interactive e-module offers significant practical implications for educators and students. The e-module serves as a practical, validated, and highly effective tool for implementing differentiated instruction in literacy, helping teachers to accommodate students' diverse reading abilities. The e-module also promotes student independence and motivation, which are crucial for effective learning.

However, several challenges were identified during the implementation, which also serve as the study's limitations. One primary obstacle was the students' unfamiliarity with using computers, which led to difficulties in operating the e-module. This finding highlights a crucial practical implication: for the e-module to be used effectively, teachers must ensure that students possess basic computer operation skills, such as recognising and using a mouse, before implementation.

This study's primary limitation is its small sample size (n=5) and a short-term implementation period, which restricts the generalizability of the findings and the ability to assess long-term skill retention. Based on these findings and limitations, several recommendations are proposed for future research. First, this study should be replicated with a larger and more diverse sample to confirm the findings' generalizability. Second, a longitudinal study is recommended to evaluate the long-term impact of the e-module on students' reading proficiency. Finally, future research could explore the effectiveness of this e-module in different educational settings and grade levels to further validate its utility.

CONCLUSION

Based on the results of research and development on instructional materials in the form of an interactive e-module based on the Teaching at the Right Level (TaRL) approach to improve students' reading literacy skills, the following conclusions can be drawn: 1. The developed TaRL-based interactive e-module possesses several key characteristics. It attracts students' interest and motivation to read. The materials are designed to accommodate various levels of students' reading abilities. Furthermore, the e-module includes interactive features such as audio, video, quizzes, and hyperlinks, enabling students to use it independently.

The TaRL-based interactive e-module has been validated for its feasibility of use by expert validators, including a language expert, media expert, and content expert. The validation results indicate that the module is highly valid and requires no revision. In addition, the practicality of the module has been tested by both teachers and students. The response data show that the e-module is highly practical for use in classroom instruction.

Students' reading literacy skills improved after using the TaRL-based interactive e-module. This improvement is evident from the increased reading test scores across the baseline 1 (A1), intervention (B), and baseline 2 (A2) phases, which show an upward trend. Additionally, the module's effectiveness was confirmed through the Normalized Gain (N-Gain) test, which yielded

a high score. Therefore, it can be concluded that the use of the TaRL-based interactive e-module is effective in enhancing students' reading literacy skills.

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