

Developing Bilingual E-Comics (Aceh–Indonesian) on Tajwid Rules to Enhance Learning Outcomes in Madrasah

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Abstract

The use of innovative learning media is now an urgent need to address increasingly complex learning challenges, especially in strengthening students' understanding and interest in learning. This study aims to develop innovative learning media in the form of bilingual e-comics (Aceh–Indonesian) on tajwid material, specifically the rules of Noon sakinah or tanween in Min. The background of this study is based on the low effectiveness of tajwid learning due to the dominance of conventional methods, the lack of interactive media, and the language gap between the lesson material and the daily lives of students in Aceh. Through the 4D (define, design, develop, disseminate) Research and Development (R&D) approach, this research focuses on the stages of needs analysis and product design by involving Qur'an Hadith teachers from various Madrasah Ibtidaiyah Negeri (State Elementary Islamic School) in Aceh. The survey results show that all teachers recognize the importance of learning media and the majority are in dire need of innovative media such as bilingual e-comics. The design process was carried out by compiling tajwid material in a bilingual digital comic format, complete with contextual illustrations and narratives that are close to the local culture. Expert validation stated that this media product was feasible with minor revisions, and the teachers' responses were very positive in terms of ease of use and attractiveness in the classroom. Limited implementation at Madrasah Ibtidaiyah Negeri 11 Banda Aceh showed a significant increase in student understanding and motivation. This study recommends the use of bilingual e-comics as a modern solution to overcome tajwid learning challenges, while also serving as an effort to preserve local culture through the integration of local languages in digital learning materials.

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INTRODUCTION

Media is a tool or means used to convey messages or information in the learning process so that learning objectives can be achieved effectively and efficiently. Learning media plays an important role in helping teachers deliver material and making it easier for students to understand the concepts being taught. According to experts, media can be instructional message-carrying technology that can be seen, read, heard, and manipulated (Junaidi 2019). Leslie J. Briggs, for example, defines media as physical tools used to convey content, such as tape recorders, video recorders, pictures, cameras, televisions, graphics, and computers.

Comics originated from sequential images that first appeared in the form of satirical cartoons in European and American newspapers in the late 19th century as a means of entertainment and social criticism (Wessely 2017). Comic books are an effective and efficient learning medium for conveying information or educational messages to students, mainly because they combine visual elements in the form of images and text in an interesting storyline. The colorful pictures and concise narration make comics easy to understand and appealing to students, thereby increasing their interest in reading and motivation to learn. In addition, comics can also help students understand abstract or difficult material through analogies and depictions of stories in everyday life, making the learning process more enjoyable and meaningful (Mikamahuly, Fadieny, and Safriana 2023).

Bilingual e-comics are a digital learning medium that combines visual elements, narration, and local and national languages to facilitate students' understanding of the subject matter. The use of digital comics not only utilizes visual advantages to attract students' interest but also adapts the language to the local cultural context, making the material more relevant and easier to understand. Research shows that bilingual e-comic media can improve student learning outcomes because students feel more engaged, their motivation to learn increases, and the information conveyed is easier to remember through interesting illustrations and stories. In addition, the bilingual format helps students understand the material in two languages at once, namely Indonesian and Acehnese, as well as enriching their vocabulary and strengthening their understanding of concepts in greater depth (Afriana and Prastowo 2022).

Tajwid learning is an integral part of Islamic religious education, especially in teaching the Qur'an in Madrasah Ibtidaiyah Negeri (MIN). Tajwid itself is the science that discusses how to read the Qur'an correctly according to the rules of pronunciation, length, and characteristics of letters that have been determined (Assya'bani et al. 2021). Through tajwid learning, students are not only able to read the Qur'an correctly, but also develop a deeper love and appreciation for the holy book. Tajwid learning also involves the use of fun media and strategies, making the classroom atmosphere more interactive and effective in achieving learning objectives.

However, the dominant learning methods, which are lectures and memorization, often pose challenges for students in understanding and applying the rules of tajwid, especially the rules of Noon sakinah or tanween (Fauziah, Usman, and Komariah 2025). The lack of interactive and interesting learning media also contributes to low learning outcomes for students in studying tajwid in depth. As a result, many students find it difficult to read the Qur'an correctly according to the rules of tajwid. This shows that the learning approach that has been used so far has not been able to optimally meet students' learning needs, so learning media innovation is needed to improve student learning outcomes (Ningsih 2023).

The ideal situation is for students to be able to understand tajwid material in an interactive and enjoyable way, so that they can apply it correctly when reading the Qur'an. To achieve this goal, innovative learning media is needed that can clearly visualize tajwid concepts, present material in an easy-to-understand manner, and utilize digital technology that is familiar to students' lives today. One innovation that has the potential to meet this need is a bilingual e-comic (Acehnese-Indonesian). This medium not only provides attractive visuals, but also combines elements of the regional and national languages to preserve local culture while making it easier for students to understand tajwid material (Kadek Icahayati, Kadek Yudianta, and Gusti Ayu Putu Sukma Trisna 2024).

In addition, many children in rural areas or villages in Aceh are more accustomed to using the Acehnese language in everyday conversation, including when they first learn to read the Qur'an, especially regarding tajwid rules such as noon sakinah or tanween. Therefore, when tajwid material is delivered only in Indonesian at school, they often have difficulty understanding the concepts thoroughly. Vygotsky's sociocultural theory emphasizes that language, as a tool for cultural mediation, facilitates learning through social interaction in the Zone of Proximal Development (ZPD), where the local or mother tongue supports the understanding of concepts more easily than a foreign language. By presenting bilingual e-comics (Acehnese-Indonesian), students can relate explanations in the national language to their prior knowledge in the regional language, making the learning process more natural and meaningful.

The development of this learning media requires a comprehensive needs analysis. Based on the results of initial observations of the learning process at MIN 11 Banda Aceh, it was found that there was no bilingual e-comic learning media for the tajweed material on the law of dead nun or tanwin. The results of the observation also showed that students often felt bored because of the non-interactive approach, while teachers had difficulty simplifying the concept of tajweed to make it easier for students to understand. Therefore, the development of a bilingual e-comic based on local culture and digital technology is needed, it is hoped that it can be a strategic step to bridge the gap

between traditional methods and students' needs for modern learning (Ferdinanda 2011).

Previous research has already proven the benefits of applying e-comics in learning, such as the study conducted by (Mamolo 2019) which raised the theme of developing interactive digital mathematics comics (DIMaC) for high school students in general mathematics subjects. Then there is the research conducted by (Abrori et al. 2024) which examines the integration of mathematics and science to explain socio-scientific issues in educational comics for elementary school students. Next is research on the theme of Gutter Talk: building narratives together using comics in the classroom (Wallner 2019). Then there is research related to drawing science comics: exploring children's conceptions by drawing comics about science (Lamminpää, Vesterinen, and Puutio 2023). Another study discussing the problems faced by students in reading the Qur'an in junior high schools and MTs also revealed that the rules of reading mad and nun mati/tanwin are the two materials that are most difficult for students to understand (Nurdiana et al. 2022). In addition, the development of bilingual e-comic media has been carried out in several other subjects, such as science and Indonesian language, and has proven to be effective in increasing student interest, understanding, and involvement in learning. Furthermore, research on bilingual e-comics on sub-topics such as parts of the blood, for example, shows positive responses from students to the visual format and relevance of the material presented bilingually. Students feel happier, find the material easier to understand, and the learning atmosphere becomes more enjoyable (Aisyah, Panjaitan, and Marlina 2016). However, to date, the use of bilingual e-comics in tajwid material, especially the rules of noon sakinah or tanween, is still very limited, especially in MIN environments in Aceh.

Based on the background of the problem described above, this study aims to answer several main questions that are the focus of this study. First, how is the process of developing bilingual e-comics (Aceh-Indonesian) designed to present tajwid material, especially the rules of Noon sakinah or tanween, for MIN students? Second, what is the level of feasibility of the bilingual e-comic media when viewed from the results of expert assessments, both in terms of content, language, and media display? These aspects form the basis for designing, testing, and evaluating the development of this learning media so that it suits the needs of students and supports the tajwid learning process more optimally.

METHODS

This study uses a Research and Development (R&D) approach with a 4D model (define, design, develop, disseminate). The R&D approach was chosen with the aim of developing bilingual (Acehnese-Indonesian) e-comic learning media on the tajwid rules of noon sakinah or tanween for Min students. The R&D method was chosen because it is suitable for producing learning products that are valid, effective, and practical for use in the context of education (Okpatrioka, 2023). The test subjects in the development of bilingual e-comics (Aceh-Indonesian) on the subject of tajwid rules for noon sakinah or tanween involved 39 third-grade Min students as the main users and one Al-Qur'an Hadis subject teacher.

This research method was carried out systematically, beginning with a needs analysis through a questionnaire administered to 15 Quran and Hadith teachers at Islamic elementary schools in various regions, including Banda Aceh, Bireuen, Lhokseumawe, Lamno, and South Aceh, to identify the learning conditions and problems with the noon sakinah or tanween material as the basis for media design. In the *development* stage, a bilingual (Acehnese-Indonesian) e-comic was developed and validated by subject matter experts, media experts, and language experts, and then tested on a limited basis with students. Data in the form of questionnaire scores and suggestions were analyzed by calculating the average and percentage of feasibility and reducing qualitative input for product revision. After being declared feasible, a pretest, media application, and posttest were conducted to measure learning outcome improvement, as well as interviews to obtain feedback from teachers and students.

Data analysis in this study was carried out through three main stages, namely data reduction, data presentation, and conclusion drawing. Data reduction was carried out by

grouping the data obtained, discarding irrelevant data, and organizing it systematically for easy analysis. Data presentation was carried out in the form of tables, percentages, and structured descriptions for easy understanding and interpretation. For learning outcome data, quantitative analysis was conducted by comparing pretest and posttest scores to see the improvement (gain) in learning outcomes. The final stage was drawing conclusions, which involved formulating the final results of the study based on all the quantitative and qualitative data that had been analyzed as a basis for making decisions regarding the effectiveness of the media developed.

This research went through several systematic and structured stages, namely: First, Define (Definition) – This stage aims to identify and define the needs in the learning process. Researchers conducted a needs analysis by collecting data through the random distribution of questionnaires to teachers of Al-Qur'an Hadith at the Min level in Aceh. The data obtained from the distribution of questionnaires to teachers of Al-Qur'an Hadith subjects at Min were analyzed using quantitative descriptive and qualitative descriptive analysis. The answers to the questionnaire in the form of choices (e.g., Likert scale) were calculated in terms of frequency and percentage to determine the extent of teachers' needs for new learning media, such as bilingual e-comics. The results of these calculations were then presented in tables or diagrams to make them easier to understand. Meanwhile, data in the form of open-ended answers or comments from teachers were analyzed qualitatively by grouping the answers based on specific themes, such as obstacles to learning tajwid, limitations of existing media, and expectations for new media. Through a combination of these two analyses, researchers can draw conclusions about real needs in the field, which form the basis for product design in the next stage. This analysis forms the basis for designing relevant and effective e-comic media.

Second, Design – At the *design* stage, researchers focused on the creative process of creating an engaging and educational bilingual e-comic. The creation of illustrations began with the preparation of *line* art sketches using the Affinity Photo application, which depicted the main characters, such as teachers and students, in a learning environment at Min (MI). Once the sketches are complete, the illustrations are colored and the layout of the e-comic is arranged using the Affinity Designer application. This includes adding a wallpaper that realistically represents the classroom and school atmosphere, as well as selecting a harmonious color combination that matches the characters in the story to make the e-comic more vivid and appealing to students.

Next, the researchers added *speech balloons* containing dialogues between characters about the tajwid rules for noon sakinah or tanween, accompanied by translations into commonly used Acehnese to reinforce the bilingual aspect. This design process aims to ensure that the bilingual (Acehnese-Indonesian) e-comic not only functions as an informative learning medium, but also preserves the local culture of the students. In addition, the e-comic is designed in a digital flipbook format that can be accessed via a link, so it can be opened using a computer or smartphone, making it easy for students to access learning materials flexibly anytime and anywhere.

Third, Development-- In the *development* stage, the validity level of the product is determined using a validity percentage formula, namely $V = \frac{\text{Score obtained}}{\text{Maximum score}} \times 100\%$. Example of expert validation results table $\frac{\text{Score obtained}}{\text{Maximum score}}$ Validation Instrument (Likert Scale 1–5): 1 = very poor, 2 = poor, 3 = adequate, 4 = good, 5 = very good

Table 1. Development Indicators

Aspects Assessed	Indicators	Expert Score 1	Expert Score 2	Expert Score 3	Total Score	Average
Content	Curriculum Alignment	4	5	4	13	4.33
Language (Aceh–Indonesian)	Language clarity	4	4	5	13	4.33

Media (appearance & design)	Illustration/visual quality	4	4	4	12	4.0
Total	-	-	-	-	38	4.22

Based on the data, the score obtained was 38 out of a maximum score of 45 (3 validators × 3 indicators × 5), resulting in a validity value of 84.44%. Referring to the research development criteria, a percentage of 81%–100% is classified as highly valid, so the bilingual e- comic (Aceh–Indonesian) is declared highly suitable for use with minor revisions as suggested by the experts.

Fourth, Disseminate – The developed and tested product was then disseminated to several Min in Aceh for wider use in learning. Before entering the *dissemination* stage, the product was first tested through implementation using a single-group pretest– posttest design to measure the improvement in student learning outcomes on the subject of noon sakinah or tanween. In addition, interviews were conducted with teachers and students to obtain qualitative data on the practicality, ease of use, and responses to the developed media. The increase in scores and positive responses from teachers and students became the basis for declaring the media effective and suitable for dissemination. In the *dissemination* stage, the product was applied more widely to observe the consistency of its effectiveness and acceptability in different madrasas as material for evaluation and refinement of further research.

RESULTS AND DISCUSSION

Teacher Needs Analysis (Define)

Based on the results of a needs analysis survey distributed to teachers of Al-Qur'an Hadith in several MIN in Aceh, a picture emerged that supports the urgency of developing bilingual (Aceh–Indonesian) e-comic learning media on tajwid material, especially the rules of noon sakinah or tanween. The teachers stated that tajwid learning is often perceived as difficult by students due to its abstract nature and the need for in-depth understanding, thus requiring interesting and contextual learning media. The survey results also showed that the respondents' knowledge of learning media was very positive, with all respondents (100% of the 15 teachers surveyed at MIN al-Qur'an Hadith) stating that they knew and understood the importance of learning media in supporting the teaching and learning process. These findings confirm that educators are highly aware of the role of media in improving learning effectiveness, making the development of bilingual e-comics highly relevant and appropriate to the needs in the field.

Furthermore, the researcher sought to determine the responses of teachers of Qur'an Hadith regarding the use of learning media in teaching Qur'an Hadith at Min. The results of the teachers' statements can be seen in the figure 1.

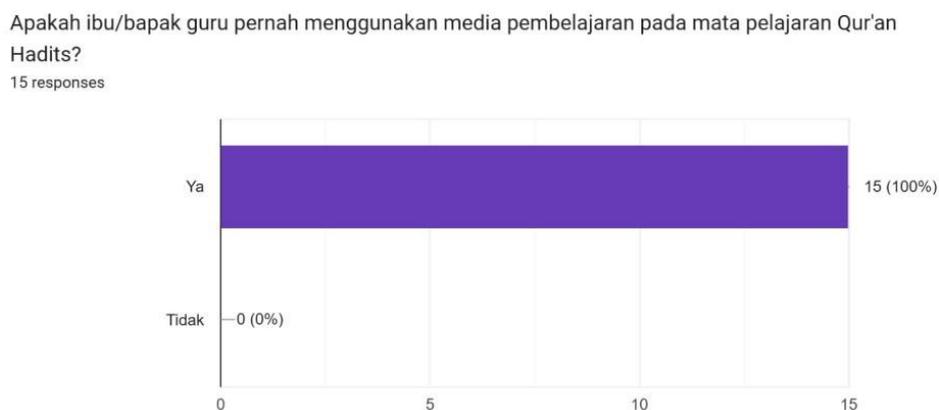


Figure 1. Survey Result

The survey results shown in the figure 1 indicate that all respondents (100%) stated that they had used learning media in teaching Qur'an Hadith subjects. This data shows that teachers understand the importance of the role of learning media as one of the main components in supporting the teaching and learning process. The use of learning media helps teachers deliver material more effectively, attract students' attention, and facilitate understanding of the concepts taught, especially for materials that require visual or interactive explanations (Titin et al. 2023). These findings also reflect the awareness among educators of the importance of innovation in teaching methods to improve the quality of education, especially in the field of religious education.

In the next question, the researcher tried to find out what learning media had been used by Qur'an Hadith teachers in Min so far. The teachers' responses can be seen in the figure 2.



Figure 2. Survey Result

Based on the figure 2, the most frequently used learning media by Quran Hadith teachers are textbooks and student books, with a percentage of 80% (12 respondents). Furthermore, printed images or posters and student worksheets (LKS) were each used by 60% (9 respondents). Digital presentation media such as PowerPoint were also quite popular, used by 53.3% (8 respondents). In addition, learning videos and audio media (voice recordings, songs, etc.) are used by 40% (6 respondents) each. Learning media based on the surrounding environment (e.g., real objects) are used by 33.3% (5 respondents), while learning media based on web-based digital applications or platforms and interactive media based on technology are only used by 13.3% (2 respondents). Educational game-based media was used by 26.7% (4 respondents). However, this survey shows that no teachers use comics as a learning tool. This indicates the potential for utilizing comics as an innovative alternative to help students understand Qur'an Hadith material in a more interesting and enjoyable way.

This data shows that teachers use conventional learning media such as books, posters, and worksheets more than technology-based or digital media. This could be due to limited technological facilities or a lack of training in the use of digital media. However, the diversity of media used reflects teachers' efforts to utilize various learning tools to support students' understanding of the Qur'an Hadith subject (Nur Azizah 2021). The researcher sought to explore more information about the challenges faced by teachers of Qur'an Hadith at Min in teaching the material on the rules of noon sakinah or tanween. The researcher found that teachers of Qur'an Hadith at Min basically understood the material on the rules of noon sakinah or tanween well, both in terms of concepts and examples of their application in reading. However, teachers still find it difficult to convey this material to students effectively. These difficulties are more related to the pedagogical process, such as differences in students' ability to read the Qur'an, low interest in learning among some students, and limited attractive and varied learning media to explain the differences in reading rules () such as idzhar, idgham, iqlab, and ikhfa'. As a result, even though teachers have mastered the material, they still face challenges in ensuring that all students understand and are able to practice the rules of noon sakinah or tanween correctly and comprehensively.

Meanwhile, the results of a survey aimed at determining the extent to which students'

experience difficulties in understanding the material on noon sakinah or tanween according to teachers' views show that most teachers (60%) believe that the material is not difficult for students to understand. However, there are still 40% of teachers who assess that students face difficulties in understanding the material. This difference in perception reflects variations in the level of student understanding, which may be due to the teaching methods used, limitations in learning media, or differences in learning abilities among students. Therefore, it is important for teachers to continue to explore and develop more creative and interactive learning strategies, such as the use of visual and audio media, as well as educational games, to support students' optimal understanding. (Kismatun, 2022).

Next is the sixth question of the questionnaire. The researcher wanted to know whether Quran and Hadith teachers at Min were familiar with E-comic-based learning media. The teachers' opinions can be seen in figure 3.

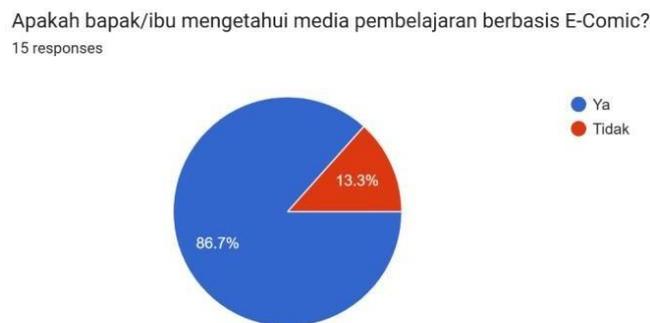


Figure 3. Survey Result

Based on the figure 3, the majority of respondents (86.7%) stated that they were familiar with e-comic-based learning media. However, 13.3% of respondents were not familiar with this type of learning media. These results indicate that e-comic-based learning media are already quite familiar to most teachers. This opens up opportunities to utilize e-comics as an innovative alternative in learning, especially for materials that require a visual and narrative approach. However, further efforts, such as training or socialization, are needed to introduce this media to teachers who are not yet familiar with it, so that its use can be more optimal in supporting the learning process (Datunsolang 2024).

The use of e-comic-based learning media in delivering noon sakinah or tanween material in Min is still very minimal. Of the total 15 teachers who were respondents, the majority or around 66.7% stated that they had never used certain learning methods or media, including e-comics, in teaching this material. Only 33.3% of teachers admitted to having used learning media in the process of teaching tajwid. This finding reflects the low level of utilization of innovative and contextual media in tajwid learning, especially on the topic of noon sakinah or tanween rules. This low figure is an important note that emphasizes the need to encourage and develop more interesting, interactive, and student-friendly learning media, such as bilingual E-comics, to improve the effectiveness and appeal of the learning process in the classroom.

Then, this question was asked to find out whether Quran and Hadith teachers at Min needed the development of E-comic-based learning media for the material on the rules of noon sakinah or tanween. The results of the teachers' opinions can be seen in figure 4.

Apakah diperlukan pengembangan media pembelajaran berbasis E-Komik untuk materi hukum nun mati atau tanwin?
15 responses

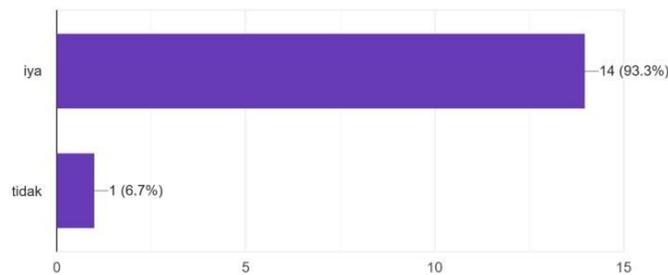


Figure 4. Survey Result

Based on the bar chart (figure 4), it can be seen that the majority of respondents, namely 14 out of 15 people (93.3%), stated that the development of E-Comic-based learning media for the material on the rules of noon sakinah or tanween was indeed necessary. Only one respondent (6.7%) disagreed, stating that the development of such media was not necessary. This data shows that there is a very high demand among respondents for more interactive and interesting learning media innovations, especially in the form of E-Comics, to assist in the learning process of noon sakinah or tanween rules.

The next question aimed to determine whether Quran and Hadith teachers at Min were willing to use E-comic-based learning media for noon sakinah or tanween material. The results of the teachers' opinions can be seen in following Figure.

Apakah bapak/ibu mau menggunakan media pembelajaran berbasis E-Komik pada materi nun mati atau tanwin, bila nanti telah tersedia untuk digunakan?
15 responses

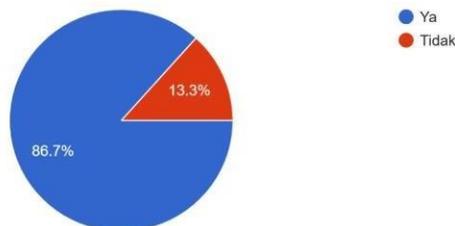


Figure 5. Survey Result

Based on the figure 5, it can be seen that the majority of respondents are very enthusiastic about the use of E-Comic-based learning media for noon sakinah or tanween material. Of the total 15 respondents, 86.7% or 13 people stated that they were willing to use this media if it were available. Meanwhile, only 13.3% or 2 respondents stated that they were not willing to use it. This data shows that E-Comic-based learning media innovation is in high demand and has great potential to be applied in the learning process, especially in the material on the rules of noon sakinah or tanween. The high level of support from the respondents is also an indicator that the application of E-Comic can be an effective solution to increase students' interest and understanding of the material being taught.

The results of the questionnaire on the last question show that the majority of Qur'an Hadith teachers at Min consider E-comic-based learning media to be very helpful in explaining noon sakinah or tanween material to students. As shown in Figure 10, of the 15 respondents involved, 14 people or 93.3% stated that E-comic media facilitated their learning process, while only 1 person or 6.7% thought otherwise. These findings show that E-comics are not only visually appealing, but also effective in conveying abstract concepts such as tajwid reading rules. Thus, E-comic media has great potential to be applied more widely as a learning innovation that can improve students'

understanding and engagement in learning tajwid materials, especially the rules of noon sakinah or tanween.

Design of Bilingual E-comics (Design)

The comic design in the development of bilingual e-comics (Aceh–Indonesia) on the subject of tajwid hukum *noon sakinah or tanween* is systematically designed to suit the needs, characteristics, and cognitive development of Min students. The development process of this media is carried out through several interrelated and structured stages, as follows.

Planning and Conceptualization Stage

In the initial stage, researchers conducted planning by developing the basic concept of the e-comic. This planning included determining learning objectives, selecting tajwid material on noon sakinah or tanween that was in line with the Min curriculum, and determining a bilingual approach using the Acehnese and Indonesian languages. At this stage, the comic storyline was also determined, packaged in the form of episodes of everyday conversations that are close to the students' lives, so that learning becomes more contextual and communicative (Adnas and Anjastri 2022). An overview of the initial concept and storyline development of the e-comic can be seen in the figure 6.



Figure 6. Character

Bilingual Script Development Stage

After the concept was established, the researchers compiled the comic dialogue script in two languages, namely Acehnese and Indonesian. The script was compiled with consideration given to the appropriateness of the meaning, clarity of language, and the level of understanding of Min students. The dialogue was designed to be simple, communicative, and not too long so that it would be easy for students to understand, while also supporting the achievement of tajwid learning objectives. An example of the bilingual script in the e-comic can be seen in the figure 7.

```
Teungku: Get that teumanyong Ahmad, bighunnah nyan kor peuraya su tapi ta baca dengung
Dewi: Ustadz, kalau idgham bilaghunnah itu bagaimana?
Dewi: Teungku, meunyo idgham bilaghunnah nyan kiban?
Ustadz: Ma sya allah...Dewi sudah tidak sabar lagi deŋan idgham bilaghunnah ya, masih semangat kan semua?
Teungku: Ma sya allah...Dewi ka hana saba the deungön idgham bilaghunnah nyeu, mantoeng seumangat mandum?
Murid: Insyallah Ustadz,...
Murid: Insyallah Teungku,...
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Figure 7. Conversation Script

Sketch and Visual Illustration Creation Stage

The next step is to create a digital manual sketch as the basis for comic illustrations. The sketches are made using the Affinity application, paying attention to the characters, expressions, and backgrounds that reflect the local environment and culture of Aceh. The characters' clothing designs are made in accordance with the customs and culture of the Acehnese people so that they appear familiar to students, thereby increasing their interest in learning and helping them understand the material more quickly. This approach is in line with Vygotsky's social constructivism theory, which emphasizes the importance of cultural context and environment in the learning process (Smolucha and Smolucha 2021). The following are examples of sketches and visual illustrations that have been designed in the development of e-comics.



Figure 8. Visual Illustration

Coloring Stage

Once the sketch is complete, the coloring process is carried out using the Affinity Photo application. The colors are chosen to be bright but soft so as to attract the students' attention without distracting them from the material. The coloring is tailored to the characteristics of Min students, with clear contrasts between the characters, background, and dialogue text. This stage aims to strengthen the visual appeal and help students identify characters and learning situations in the comic. The final results of the coloring process in the development of the e-comic can be seen in the figure 9.



Figure 9. Coloring Stage

Layout and Composition Stage

The next step is to arrange the layout and composition of the pages using Affinity Designer. At this stage, the researcher arranges the position of the comic panels, speech bubbles, illustrations, and bilingual text (Acehnese–Indonesian) so that they are arranged proportionally and systematically. The layout is designed to be simple and not too crowded, making it easier for students to read the dialogue and understand the tajwid material gradually. The placement of the Aceh and Indonesian languages is arranged side by side or alternately in the dialogue to help students understand the concepts of the material while getting used to using two languages. The following is a preview of the layout and composition of the pages in the developed e-comic.



Figure 10. Layout and Composition

Digitization and Flipbook Presentation Stage

Once all pages of the e-comic have been designed, the final product is converted into digital format and presented in the form of a flipbook. The flipbook format was chosen because it provides a reading experience similar to that of a printed book, while remaining interactive and easily accessible online. This bilingual e-comic is then uploaded and can be accessed via a link shared with teachers and students, allowing for flexible use of the media both inside and outside the classroom. As a final presentation, the bilingual e-comic in flipbook format can be viewed and accessed via the following link: <https://online.fliphtml5.com/qiazq/Layout-Rev3>

Media Access and Utilization Stage

Bilingual e-comics in flipbook format can be accessed using digital devices such as laptops, tablets, and smartphones connected to the internet. Easy access via this link supports students' independent learning and makes it easier for teachers to integrate e-comics into the process of teaching the Qur'an and Hadith. Overall, the design of this e-comic integrates visual, linguistic, and local Acehnese cultural elements into a single communicative, attractive digital learning medium that is suitable for Min students. To provide a clearer picture of the form and final appearance of the developed medium, the following is a visualization of the bilingual e-comic design.



Figure 11. Final Stage

Development of Bilingual E-Comic

During the development stage of this bilingual e-comic product, it will be validated by experts, including tajwid material experts, Acehnese and Indonesian language experts, and learning media experts. Design validation is carried out by material experts, language experts, and media experts to ensure that the content, language, and visual appearance meet the standards of learning (Saifullah, Syaban, and Rahmat 2024). This validation aims to ensure that the content is correct and in accordance with tajwid rules, the use of language is appropriate, and the visual appearance is attractive and suitable for use in learning (Mahisarani, Sinaga, and Anas 2023). The development steps carried out in this stage include: (1) creating e-comic learning media on the subject of tajwid

rules for Noon sakinah or tanween, (2) arranging the visual design and layout of the comic to be attractive and in accordance with instructional design principles, (3) conducting a validation process by experts using a previously developed assessment instrument, and (4) revising the product based on input, notes, and suggestions from validators to improve the quality of the media.

Based on the validation results from the experts, a number of very constructive inputs were obtained for product refinement. The subject matter experts provided corrections on the accuracy of the presentation of tajwid rules, especially in the compilation of reading examples of the Noon sakinah or tanween rules to be more representative and in accordance with the standards of reading the Qur'an. Language experts suggested improvements in diction and sentence structure in the comic narrative so that the use of Indonesian and Acehnese would be more balanced, easy to understand, and relevant to the local context of the students. Meanwhile, media experts provided technical advice on color selection, layout, and the suitability of illustrations and the material presented. Several illustrations were also revised to strengthen conceptual understanding, and the narrative was improved to be more communicative, less formal, and still educational (Astuti, Muthmainnah, and Rosiyanti 2021).

Expert Validation Results Table

Table of Expert Validation Results for the Bilingual E-Comic Media (Aceh–Indonesian) on Tajwid Rules for the Silent Nun or Tanwin

Table 2. Expert Validation of Media

Aspects Evaluated	Indicators	Expert Score 1	Expert Score 2	Total Score	Average	Category
Media	Display Design	4	4	8	4.0	Very Valid
Media	Technical Quality	4	4	8	4.0	Highly Valid
Media	Ease of Use	3	4	7	3.5	Very Valid
Media	Media Integration with Content	4	4	8	4.0	Very Valid
Media	Media Appeal	4	4	8	4.0	Highly Valid

Table 3. Subject Curriculum Expert Validation

Aspects Assessed	Indicators	Expert Score 1	Expert Score 2	Total Score	Average	Category
Materials	Curriculum Alignment	4	4	8	4.0	Highly Valid
Materials	Truth & Accuracy of Material	4	4	8	4.0	Highly Valid

Table 4. Subject Matter Expert Validation

Aspects Assessed	Indicators	Expert Score 1	Expert Score 2	Total Score	Average	Category
Material	Depth & Breadth of Material	3	4	7	3.5	Very Valid
Materials	Presentation of Material in E-Comics	4	4	8	4.0	Very Valid
Materials	Learning Suitability	3	4	7	3.5	Highly Valid

Table 5. Subject Language Expert Validation

Aspects Assessed	Indicators	Expert Score 1	Expert Score 2	Total Score	Average	Category
Language	Language Accuracy & Clarity	4	3	7	3.5	Very Valid
Language	Readability & Suitability for Students	4	4	8	4.0	Highly Valid
Language	Bilingual Integration (Aceh–Indonesia)	3	4	7	3.5	Highly Valid
Language	Language Consistency & Aesthetics	4	4	8	4.0	Very Valid
Language	Language Suitability for Learning	4	3	7	3.50	Highly Valid

Based on the results of media expert validation, all aspects of the assessment showed a highly valid category. In terms of display design, technical quality, media integration with material, and media appeal, each aspect received an average score of 4.00. Meanwhile, the aspect of ease of use received an average score of 3.50. These results indicate that the developed e-comic has met the eligibility standards in terms of appearance, technical quality, and appeal, and is considered easy to use in the learning process. In the material expert validation, all indicators were also in the highly valid category. The aspects of curriculum suitability, correctness and accuracy of material, and presentation of material in e-comics each received an average score of 4.00. Meanwhile, the aspects of depth and breadth of material and learning feasibility received an average score of 3.50. These findings indicate that the material on noon sakinah or tanween presented is in accordance with the curriculum, conceptually accurate, and suitable for use in learning. Furthermore, the results of the language expert validation show that all aspects are also in the highly valid category. The aspects of readability and suitability for students, as well as consistency and language aesthetics, received an average score of 4.00. Meanwhile, the aspects of language accuracy and clarity, bilingual integration (Acehnese–Indonesian), and language suitability for learning received an average score of 3.50. This shows that the use of language in the e-comic is clear, in line with the characteristics of the students, and able to integrate Acehnese and Indonesian well and is suitable for use in learning.

Dissemination of Product Results

The dissemination stage is the stage of distribution and implementation of the final learning media product that has gone through the design, development, and feasibility testing processes. The bilingual e-comic product (Aceh–Indonesia) on the subject of tajwid hukum Noon sakinah or tanween, which has been revised based on expert input, is then distributed to target educational units in accordance with the 4D development model (Thiagarajan, Semmel, and Semmel 1974).

The limited dissemination and testing were focused on MIN 11 Banda Aceh, specifically in the third grade, as the location for media implementation. The dissemination process was carried out in coordination with the Al-Qur'an Hadith subject teacher. The teacher acted as a facilitator in the application of e-comic media in the classroom. The media was implemented by utilizing digital e-comic links displayed using an infocus projector in the classroom. Before the media was shown, all students were first asked to take a pre-test to determine their initial abilities related to the tajwid material on Noon sakinah or tanween. Next, the teacher displays the bilingual e-comic in a classical manner so that it can be watched and studied together by all students. After the learning process using e-comic media is complete, students are given a post- test to measure the improvement in learning outcomes after using the media. In addition, the teacher also observes the involvement and responses of students during the learning process.

The results of the evaluation at the dissemination stage showed an increase in students' understanding of tajwid material, as seen from the difference between the pre-test and post- test results. These findings form the basis for evaluation and reference for the improvement of e- comic media in further development research, so that the media developed can be used more optimally and sustainably. Based on the pre-test results of 39 students, an initial picture of the students' ability to understand the material before using the bilingual e-comic media was obtained. The scores obtained by the students ranged from 40 to 90. Most students obtained scores in the moderate category, which was in the range of 50–70, indicating that their initial understanding of the material was still at a sufficient level. There were several students who obtained high scores, namely 80 and 90, indicating that a small number of students already had a good understanding of the material before the treatment was given. However, there were still a number of students who obtained a score of 40, indicating that their understanding of the material was still low and needed reinforcement.

In general, the distribution of pretest scores shows that students' initial abilities are still diverse and uneven. The majority of students have not yet reached an optimal level of mastery, so more interesting and effective learning innovations are needed to help improve their understanding. These pretest results are an important basis for measuring learning improvement after the application of bilingual e-comic media to the subject of noon sakinah or tanween. After the learning process using bilingual e-comic media (Aceh–Indonesian) on the subject of noon sakinah or tanween was carried out, the researcher conducted a posttest to determine the improvement in student learning outcomes. This posttest aimed to measure the effectiveness of the media that had been developed and to compare the results with the previous pretest scores.

Table 6. Posttest Results

No	Name	Score	Remarks
1	AK	80	Completed
2	AA	70	Completed
3	AF	80	Completed
4	AA	90	Completed
5	AZ	70	Completed
6	AA	80	Completed

7	AP	90	Completed
8	AZS	80	Completed
9	AM	80	Completed
10	BA	90	Completed
11	CNA	90	Completed
12	CSH	90	Completed
13	CSA	70	Completed
14	FKM	80	Completed
15	FQA	80	Completed
16	RIG	80	Completed
17	IS	80	Completed
18	KA	70	Completed
19	LH	80	Completed
20	LZ	90	Completed
21	MA	90	Completed
22	MAA	90	Completed
23	MA	80	Completed
24	MAA	70	Completed
25	MFA	80	Completed
26	MFA	70	Completed
27	MHA	80	Completed
28	MH	80	Completed
29	MKA	80	Completed
30	NQA	70	Completed
31	RHA	80	Completed
32	RFA	90	Completed
33	SS	80	Completed
34	Valid	80	Completed
35	SS	70	Completed
36	USB	70	Completed
37	UA	80	Completed
38	ZN	70	Completed
39	ZNR	90	Completed

Based on the posttest results, all students (100%) achieved the mastery category with scores ranging from 70 to 90. The majority of students scored 80 and 90, which shows a significant improvement compared to the previous pretest results. No students scored below the mastery standard. These findings indicate that the use of bilingual e-comics is effective in improving students' understanding of tajwid noon sakinah or tanween. This improvement indicates that presenting material through a visual, narrative, and bilingual approach can help students understand tajwid concepts more easily, interestingly, and meaningfully.

Meanwhile, an interview with Mr. MH, a third-grade Al-Qur'an Hadith teacher at Min, revealed that tajwid lessons on noon sakinah or tanween are still conducted in a conventional manner. Teachers usually write short verses or surahs on the blackboard or cardboard, then ask

students to read and identify the rules of recitation. The learning media used are still limited to textbooks, blackboards, and cardboard, so that the learning process tends to be teacher-centered and does not make sufficient use of interactive visual media. Student interest in tajwid learning is unstable. At the beginning of the lesson, students appear enthusiastic, but their attention is easily distracted due to the characteristics of third grade students, who still like to play. This condition has an impact on students' difficulty in distinguishing the types of noon sakinah or tanween rules and remembering the characteristics of each reading rule. As a result, students' learning outcomes in tajwid material are not yet optimal and still require repetition and more concrete examples. According to Mr. MH, these difficulties are caused by monotonous learning methods and limited attractive learning media, as well as a classroom atmosphere that is often noisy, which reduces students' focus on learning. Therefore, the use of story-based visual media, such as e-comics, is considered very necessary. E-comics are seen as capable of simplifying abstract tajwid material, increasing students' interest and focus on learning, and helping teachers deliver material in a more interesting and effective way, thereby improving students' understanding and learning outcomes.

CONCLUSION

The development of bilingual (Acehnese–Indonesian) e-comic learning media on tajwid material for Noon sakinah or tanween in Min has proven to be highly relevant and necessary to overcome learning challenges in the digital age. The results of the teacher needs analysis show a high awareness of the importance of learning media that is interesting, contextual, and innovative. However, the use of comic-based media, especially bilingual e-comics, is still very minimal in MIN environments in Aceh. Through the application of the 4D development model (define, design, develop, disseminate), this media was systematically designed, starting from the identification of needs, design, validation by experts, to the product dissemination stage. Expert validation assessed that bilingual e-comics are suitable for use, although minor improvements are needed in terms of language, illustrations, and material presentation. The implementation of bilingual e-comics at MIN Negeri 11 Banda Aceh has proven to increase students' understanding and motivation in learning the rules of Noon sakinah or tanween. Teachers also assessed that this media is very helpful in delivering abstract and difficult material, while strengthening student engagement and local cultural identity through the use of the Acehnese and Indonesian languages. Thus, bilingual e-comics are not only innovative and interesting, but also effective in improving tajwid learning outcomes in an interactive, enjoyable, and contextual manner. The final product is deemed suitable with minor revisions and can be more widely integrated as a modern solution in religion education based on local culture and digital technology.

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