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The Application of Styrofoam-QR Story Tree Media to Improve the Literacy Skills of Madrasah Ibtidaiyah Al-Karim Students in Understanding Fiction Texts Thru a Deep Learning Approach

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ABSTRACT

This research aims to test the effectiveness of the Styrofoam–QR Story Tree media in improving the literacy skills of understanding fictional texts among fourth-grade elementary school students thru a deep learning approach. The background of the research is based on the low ability of Indonesian students to understand fiction texts, despite the various literacy programs that have been implemented. The Styrofoam–QR Story Tree media was developed as an educational innovation that integrates visual-tactile media made of styrofoam with QR Code technology to provide a more interactive and meaningful multimodal learning experience. This study uses a quantitative method with a One-Group Pretest–Posttest design, involving all fourth-grade students of MI Al-Karim as research subjects. Data were collected thru pretest and posttest, observation, and documentation. The research results show a significant improvement in students' ability to understand fiction texts. The average score increased from 65.21 on the pretest to 81.67 on the posttest with a gain of 16.46 and an N-gain of 0.47, which falls into the moderate category. In addition, 75% of the students achieved learning completeness with scores above the Minimum Passing Criteria (KKM). These findings indicate that the Styrofoam–QR Story Tree media is effective in enhancing students' understanding of story elements such as plot, characters, traits, setting, and moral message. This media has proven capable of actively increasing student engagement, facilitating in-depth analysis processes, and supporting more contextual learning. Thus, this media has the potential to become a relevant alternative in the development of innovative literacy media in elementary schools.

Keywords: *fiction text; literacy; QR Code; deep learning; learning media*

1. INTRODUCTION

Reading literacy skills, particularly understanding fictional texts, have become one of the

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fundamental competencies that must be developed from basic education (Rahma, Handoyo, Mulyono, & Yulianto, 2025). However, the reality shows that the literacy skills of Indonesian students are still at a concerning level (Hijjayati, Makki, & Oktaviyanti, 2022). Various study results such as PISA and the National Assessment reveal that the majority of students have not yet achieved the minimum reading competence, despite the government implementing various literacy improvement programs and distributing millions of reading books to schools. This phenomenon raises important questions about the factors that cause the ongoing literacy programs to not yet successfully improve students' understanding of fiction texts optimally (Nasrullah et al., 2024).

The situation is reinforced by the results of observations in Indonesian language learning in the fourth grade of elementary school, which show that the process of learning fiction texts is still conducted conventionally. Teachers generally only ask students to read textbooks without the support of media or innovative teaching strategies. This monotonous learning makes students quickly lose focus, feel bored, and have difficulty understanding elements of the story such as plot, characters, traits, setting, and moral message (Telaumbanua, Leiwakabessy, & Tampubolon, 2025). However, the ability to understand fictional texts significantly contributes to the development of students' imagination, empathy, creativity, and critical thinking skills (Dewi & Budiharto, 2020).

On the other hand, various previous studies have shown that the use of QR Code-based media can enhance reading skills, especially early reading. Research by (Putri Alwani, Elya Rosalina, 2023) proved that QR-Code in smart book media improves students' reading skills with a high N-gain achievement of 0.73. A similar study was conducted by (Syakila, Syaiful, & Aisa, 2025), which demonstrated the validity and practicality of QR Code flashcard media in assisting early reading. However, these studies have not yet addressed the aspect of deep understanding of fiction texts, especially at the upper elementary school level. Thus, there is a need for media innovation that not only utilizes digital technology but also provides meaningful learning experiences thru the integration of visual media, audio, and physical interaction.

One of the innovations designed to address this challenge is the Styrofoam–QR Story Tree, which is a story tree-shaped media made of styrofoam equipped with QR Codes on each part (Breitmozere & Domskiene, 2025). When scanned, the QR Code directs students to various digital content such as story texts, audio fairy tales, character illustrations, and interactive activities. This combination of physical and digital media creates a multimodal learning experience that allows students not only to read but also to explore stories visually, auditorily, and kinesthetically (Nafi, 2022).

The use of this media is based on several theoretical foundations. First, Mayer's Multimedia Learning Theory asserts that the combination of text, audio, and visual elements can enhance information processing in working memory (Syamsuardi, Hajerah, Rika Kurnia R, Nur Alim Amri, 2024). Second, the constructivist theory emphasizes that understanding is built thru active learning experiences (Aqilla, et al., 2023). Third, the principle of the deep learning approach, which encourages students to analyze the content of the story in depth, connect ideas, and interpret the moral message reflectively (Deny Khusnul Khotimah, 2025). These three theories serve as the basis that media rich in stimuli can enhance the comprehensive understanding of fiction.

This study involved all fourth-grade students of MI Al-Karim as research subjects using total sampling technique. The students participated in the entire learning sequence, starting from the pretest, learning activities using the Styrofoam–QR Story Tree media, to the posttest to observe the overall impact of the media usage. Thru this process, the research is directed to answer the main question: does the Styrofoam–QR Story Tree media have the ability to enhance students' understanding of fictional texts thru a deep learning approach?

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The novelty of this research lies in the integration of styrofoam-based visual-tactile media, QR Code technology, and a deep learning approach within a single learning model. This innovation has not been found in previous research, so it is expected to make a significant contribution to the development of more interactive, contextual, and adaptive literacy media for elementary school students (Dewi, 2025).

Based on these issues, this research is directed to test the effectiveness of the Styrofoam–QR Story Tree media in improving the ability to understand fiction texts among fourth-grade elementary school students. The hypothesis of this research is that the use of this media can provide a significant improvement in students' learning outcomes compared to conventional learning. The main objective of this research is to implement and assess the impact of the Styrofoam–QR Story Tree media in the context of fiction text learning based on a deep learning approach.

This research has originality and scientific novelty in the form of the integration of visual-tactile media made of styrofoam, QR Code technology, and a deep learning approach within a single learning model. The integration of these three aspects has never been researched before, so this study provides a new contribution to the development of interactive, contextual, and meaningful literacy media in elementary schools.

2. RESEARCH METHOD

This research is a quantitative study that uses a simple experimental method thru the One-Group Pretest–Posttest design (Lestari, Herlina, Putri, & Giwangsa, 2023). This design was chosen because the research only involved one group without a control group, namely the fourth-grade students of MI Al-Karim. In this design, all students were first given a pretest to determine their initial ability to understand fiction texts. After that, the students underwent a learning process using the Styrofoam-QR Story Tree media, and subsequently given a posttest to determine the change in their ability after the treatment. The effectiveness of the media is determined by comparing the pretest and posttest results within the same group.

The subjects in this study are all the fourth-grade students of MI Al-Karim, totaling 24 students. The technique for determining the subjects was conducted using total sampling, meaning the entire population was used as the research sample. The selection of the fourth-grade class as the research subject was based on several considerations. First, based on the results of the preliminary observation, fourth-grade students show a low ability to understand fiction texts, as indicated by their difficulty in identifying intrinsic elements of the story such as plot, characters, setting, and moral message. Second, the fourth grade falls into the category of upper elementary classes that are beginning to focus on advanced reading comprehension skills, thus requiring more innovative and interactive learning media. Third, fiction text material is explicitly included in the fourth-grade Indonesian language curriculum, making the selection of this class relevant to the research objectives.

Thus, the selection of the fourth grade was not done randomly, but rather based on actual learning needs and the suitability with the characteristics of the material being studied. Each student participates in the entire series of activities, starting from filling out the pretest, learning using media, to the implementation of the posttest. Data collection was carried out using several techniques. The main technique is the learning outcome test, which consists of a pretest and posttest to measure the ability to understand fictional text literacy. The test instrument consists of multiple-choice questions and essays that measure aspects of understanding the plot, characters and character traits, setting, and moral message of the story. The instrument has been validated by experts, making it suitable for use. In addition, the researcher also used observations to record student engagement during the learning process, as well as documentation in the form of photos and field notes that support the research data.

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Data were analyzed using quantitative descriptive analysis. The analysis begins with calculating the average pretest and posttest scores to understand the general ability of the students. The average calculation uses the mean formula based on Sugiyono's opinion (Harahap, Nasution, & Amir, 2025). The average calculation is performed using the formula:

$$\bar{X} = \frac{\sum X_i}{n}$$

Explanation:
$\bar{X}$ = average value
X_i = value of the i-th student
n = number of students

Next, the gain score is calculated to determine the improvement in students' abilities, which is the difference between the posttest and pretest scores. The concept of gain refers to the study of learning outcome improvement used in pretest–posttest analysis (Perdana & Siswoyo, 2017) with the formula:

$$G = X_{\text{post}} - X_{\text{pre}}$$

Explanation:
G = gain (increase in learning outcome scores)
X_{post} = average posttest score (after treatment)
X_{pre} = average pretest score (before treatment)

To determine the level of effectiveness of the improvement, the Normalized Gain calculation developed by Hake (Febrinita, 2022) is used with the following formula:

$$N\text{-Gain} = \frac{X_{\text{post}} - X_{\text{pre}}}{100 - X_{\text{pre}}}$$

The criteria for interpreting N-Gain refer to Hake (1998), namely:
≥ 0.70 = high
0.30–0.69 = medium
< 0.30 = low

In addition, the percentage of learning completeness is also calculated to see the number of students who achieve the KKM score (≥ 75). This percentage calculation of completeness refers to the concept of evaluating learning outcomes in educational research, which compares the number of students who achieve completeness with the total number of students (Pangestu et al., 2021). The formula used is:

$$P = \frac{N_t}{N} \times 100\%$$

Explanation:
P=percentage of completeness
N_t=number of students who are complete
N=total number of students

The determination of the Minimum Completeness Criteria (KKM) of ≥ 75 in this study is based on the learning completeness standards commonly used in basic education units, which fall within the range of 70–75 according to school policies and refer to the assessment principles in the Curriculum applicable in Indonesia. The KKM value is set by the educational unit considering the characteristics of the students, the complexity of the material, and the school's support capacity. Thus, students are

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declared complete if they achieve a score of ≥ 75, while students who score below 75 are declared incomplete.

3. RESULTS AND DISCUSSION

The Effectiveness of Styrofoam–QR Story Tree Media on Learning Outcomes

Based on the data processing results from 24 fourth-grade students at MI Al-Karim, the following results were obtained:

Table 1. Calculation of Value Improvement

Type of Test	Average Score	Difference (Gain)	N-Gain	Category
Pretest	65,21	—	—	—
Posttest	81,67	16,46	0,47	Medium

Calculation of value increase (Gain):

G = $X_{post} - X_{pre}$

G = 81.67 - 65.21 = 16.46 T

he gain value of 16.46 indicates an increase in the average score of students after the treatment. Interpretatively, this difference falls into the moderate improvement category, as based on the learning outcome improvement criteria, a score difference of 10–20 points indicates a significant yet not optimal improvement in achieving the best results (Wahab et al., 2021). Thus, the increase of 16.46 points indicates that the media has a tangible impact on students' learning outcomes.

Normalized Gain Calculation:

$$\text{N-Gain} = \frac{X_{post} - X_{pre}}{100 - X_{pre}}$$

$$\text{N-Gain} = \frac{(81.67 - 65.21)}{(100 - 65.21)}$$

$$\text{N-Gain} = \frac{16.46}{34.79} = 0.47$$

The N-Gain value of 0.47 falls into the moderate category, referring to Hake's (1998) criteria, which is 0.30–0.69. The moderate category indicates that the improvement in learning outcomes is at an effective level, as there has been a proportional increase in students' abilities relative to the maximum score that can be achieved. In educational research, a learning process is considered effective if the minimum N-Gain value falls within the moderate category (≥ 0.30) (Wahab et al., 2021; Pendipa, 2024). Therefore, these results indicate that the Styrofoam–QR Story Tree media is effective in improving students' literacy skills.

Percentage Completion Calculation:

$$P = \frac{N_t}{N} \times 100\%$$

$$P = \frac{18}{24} \times 100\% = 75\%$$

As many as 75% of students achieved a score of ≥ 75 (KKM). The determination of KKM ≥ 75 refers to the learning completeness standards in elementary schools commonly used in the curriculum. Meanwhile, a learning process is said to be successful classically if at least 70% of students

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achieve learning completeness. Thus, the percentage of 75% mastery indicates that the learning has met the classical mastery criteria, so the media can be declared successful.

Based on three main indicators, namely:

a. An N-Gain value of 0.47 (medium/effective category)
b. An average increase of 16.46 points (medium category)
c. A classical completeness of 75% (≥ 70%)

It can be concluded that the Styrofoam–QR Story Tree media is effective in improving students' literacy skills in understanding fictional texts.

Student Involvement in the Use of Styrofoam–QR Story Tree Media

Student involvement during the learning process is one of the important indicators in assessing the effectiveness of using Styrofoam–QR Story Tree media. Based on the observation results, students showed high enthusiasm and participation during the learning activities. They actively scanned QR Codes, read digital story snippets, and arranged parts of the story on a styrofoam tree according to the plot they understood (Asy'ari et al., 2024). The following documentation illustrates student engagement during the activity.

Figure 1. Student Involvement in the Use of Styrofoam–QR Story Tree Media

The activity shows that the media is capable of creating student-centered learning. Students act as subjects who actively seek, process, and organize information. This condition is different from learning that only relies on teacher explanations, thus increasing the chances of achieving a deeper understanding. The results of the quantitative analysis show that the Styrofoam–QR Story Tree media is effective in improving students' learning outcomes. These findings are not only reflected in the improvement of pretest and posttest scores or the N-Gain categories obtained, but are also supported by the results of observations during the learning process.

These results are reinforced by findings during the learning process, where students showed active engagement while using the media. Students not only read the text but also interact with the media by scanning QR Codes, arranging storylines, and discussing the content of the story. This activity shows that learning takes place actively and meaningfully. Theoretically, these findings

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align with the principles of multimodal learning, which state that the engagement of various senses (visual, auditory, and kinesthetic) can enhance students' understanding. The combination of physical media (styrofoam) and digital (QR Code) allows students to build a deeper understanding of story elements such as characters, plot, setting, and moral message. Thus, the effectiveness of the media is not only demonstrated by the quantitative improvement in grades but is also supported by the active involvement of students in the learning process.

During the learning process, students showed high enthusiasm when using the Styrofoam–QR Story Tree media. They actively scanned QR Codes, read digital story snippets, and placed story parts on the styrofoam tree according to the plot they understood (Asy'ari et al., 2024). The following documentation illustrates student engagement during the activity.The activity shows that the media is capable of creating student-centered learning. Students act as subjects who actively seek, process, and organize information. This condition is different from learning that only relies on the teacher's explanation, thus increasing the chances of achieving a deeper understanding.

Student engagement is also evident when they discuss characters, plot, setting, and moral messages of the story based on excerpts they obtain thru QR Code. This interaction shows that the media can capture students' attention and facilitate their deeper understanding of the story's content (Rachma Indria Pinasti, 2024). Pedagogically, active student engagement is one of the indicators of learning effectiveness, especially in activity-based learning. Furthermore, the effectiveness of the media is not only viewed from a qualitative aspect but is also supported by quantitative data in the form of improved learning outcomes. Based on the pretest and posttest results, there is an increase in scores of 16.46 points. This difference falls into the moderate improvement category, referring to the Normalized Gain (N-Gain) criteria, which is $0.30 \leq g < 0.70$, indicating that the learning process has a fairly effective impact on improving students' learning outcomes.

The increase in scores indicates that the use of the Styrofoam–QR Story Tree media provides a more meaningful learning experience compared to conventional learning. Thru the activity of scanning QR Codes and directly arranging the storyline, students not only receive information passively but also engage in the process of constructing an understanding of the story's content. This active involvement allows students to understand the relationships between story elements more systematically, thereby impacting the improvement of learning outcomes.

In addition, a learning media can be considered effective if it meets the criteria of classical learning completeness. Based on Arikunto's (2013) opinion, learning is considered successful if at least 75% of students achieve scores above the Minimum Completeness Criteria (KKM). In this study, the majority of students achieved a score of ≥ 75, so classically, the Styrofoam–QR Story Tree media can be declared effective in improving students' learning outcomes. This finding is supported by the theory that learning involving various senses (visual, auditory, and kinesthetic) can enhance students' understanding and absorption. This media allows students not only to read but also to see, interact, and organize information directly, thereby strengthening their understanding of the elements of the story (Hartawan, Dirgayusari, Putri, & Lopez, 2024).

4. CONCLUSION

Based on the research and discussion results, it can be concluded that the implementation of the social inclusion program at Dinas Perpustakaan dan Kearsipan Kabupaten Pidie has been effective and in accordance with the National Library Head Regulation Number 3 of 2023. Programs such as skills training, literacy talk shows, information technology training, and independent replication activities of village libraries demonstrate a strong commitment from the institution to make the library a center for

community empowerment. The impact of this program is reflected in the improvement of individual skills, community participation in library activities, and the emergence of new economic initiatives among the village community. The success of the implementation of this activity is also strengthened by the synergy among stakeholders and the high enthusiasm of the community in participating in the program.

In addition to positively impacting the transformation of library services, this social inclusion program also makes a tangible contribution to the enhancement of community empowerment, particularly in the aspects of self-potential development, literacy improvement, and the establishment of economic independence. These findings are supported by the results of a survey conducted with 30 program participants, which show that the social inclusion program contributes 41% to community empowerment. The supporting data reinforces the results of interviews and observations that show libraries can be strategic agents of social change. By adopting a participatory approach and being based on local needs, libraries no longer function merely as storage places for books, but also as vibrant, responsive, and relevant learning spaces that address the social challenges faced by the community today. This conclusion also emphasizes the importance of sustainability and the development of social inclusion programs within the framework of literacy-based development at the regional level.

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