# Augmented Reality Book-Based "Nasretin Hoca" Folklore to Improve Reading Literacy for Elementary School Students

Nurbaiti Elita Genc[1*], Supriyati Fatma Rabia[2]
[1] Sakarya University, Turkiye
[2] Universitas Pendidikan Muhammadiyah Sorong, Indonesia

Corresponding author : *nurbaiti.genc@ogr.sakarya.edu.tr

**A B S T R A C T**

Reading literacy in elementary schools is still less than optimal because the learning resources used are still not appropriate to students' learning needs. This study aims to examine the effectiveness of using Augmented Reality (AR) Books based on "Nasretin Hoca" folklore as an innovative method to improve students' reading literacy in Türkiye elementary schools. Integrating Augmented Reality Book technology into the "Nasretin Hoca" folklore during the learning process creates an interactive and in-depth reading experience for students. AR Book provides an engaging learning experience for students by visually presented 3D animation, sound, and video. This multimedia approach enhances students' reading literacy skills, specifically in the areas of comprehension, analysis, and evaluation. This study used a quasi-experimental quantitative research methodology, specifically a one-group pretest-posttest design model that involves conducting an experiment on a single group without a comparison group. The results showed that using AR Books based on "Nasretin Hoca" folklore significantly affects students' reading literacy skills in Türkiye elementary schools. The conclusion of the research is students experienced an increase in reading skills and were able to develop comprehension, analysis, and evaluation skills of reading content.

## INTRODUCTION

Technology integration in modern society is imperative due to its ability to provide numerous advantages and conveniences (Lipson & Kurman, 2016; Oztemel & Gursev, 2020; Narang, & Tiwari, 2024). Extensive research demonstrates that technology can potentially enhance efficiency and productivity in various sectors, including health, education, and industry (Index, 2019). Moreover, technology plays a crucial role in expediting communication and facilitating access to information, thereby contributing to economic growth and societal advancement (Anasi et al., 2018; Haleem et al., 2022; Mokyr et al., 2015; Oun, 2018). Technology has impacted

education in the modern era. A study found that 92% of US elementary students use the Internet as an essential part of their learning (Anderson & Jiang, 2018). Technology makes students participate in educational processes through distance learning or e-learning, regardless of their location or time constraints (Tîrziu & Vrabie, 2015).

Various classroom technologies can improve education and student experience (Licorish et al., 2018). Technology improves student involvement, socializing, and learning, according to Thorne and Reinhardt's study (2008). Technology can also reduce accessibility and educational inequities, especially for remote or disabled students (Dubois et al., 2022). Technology helps build critical, creative, and collaborative skills needed in the digital age (Mutohhari et al., 2021). Technology in education enjoys global support. Technology is widely used in language learning in the digital age (Blake, 2008; Chun et al., 2016). Warschauer and Liaw (2011) suggest that technology has the potential to enhance multiple language skills in students, such as speaking, writing, reading, and listening. Robinson (2016) revealed that technology affects students' reading literacy skills, which are essential for successfully meeting the challenges of modern society. To enhance reading literacy among elementary school students, innovative and effective strategies, such as the incorporation of technology into the learning process, are necessary (Jung & Latchem, 2011; A. A. Lange, 2019).

Literacy skill is part of the minimum competency assessment that elementary school students must achieve for graduation. Literacy can be improved through developed digital media. Faizah et al. (2022) researched the development of a technology-based media platform called Literacycloud.com to improve literacy skills in elementary schools. Additionally, Chee et al. (2017) developed a mobile learning application to enhance literacy skills in the Chinese language. Another study by Wan et al. (2020) focused on literacy development for Arabic schools using the Arabic-Kafa application with marker-based Tracking software. These findings indicate that the use of digital media in reading instruction has the potential to enhance learning effectiveness and optimize student literacy.

Research shows that incorporating digital technology in education positively impacts the overall educational experience. The diverse features provided by digital technology can be attributed to this phenomenon (Bali et al., 2021; Kanar & Bell, 2013). AR is frequently employed in the development of technology-based educational experiences (Bower et al., 2014; Wang et al., 2018). Khan et al. (2019) found that AR technology enhances student motivation, participation, and engagement in the learning process. Estapa and Nadolny (2015) found that incorporating augmented reality (AR) into mathematics education enhances student motivation, learning outcomes, and understanding of challenging mathematical concepts. Jamrus and Razali (2019) found that AR technology positively impacts English learning by enhancing student engagement and facilitating the development of English skills.

The folklore developed in this research is Nasrettin Hoca from Turkey. The story of Nasrettin Hoca is about a figure known for his intelligence, wisdom, and humor, often conveyed through funny anecdotes that are full of meaning (Akmal et al., 2022). Nasrettin Hoca often employs unique methods to deliver profound moral messages to the community, such as the values of justice, humility, and wisdom in facing everyday problems (Damir, 2020). The values contained in these

stories emphasize the importance of critical thinking, solving problems with humor, and maintaining a balance between logic and empathy in life. Research on folklore has been conducted in various contexts and perspectives. Through various case studies, Sommers (2019) demonstrates that folklore-based approaches can enrich conservation policies, create more inclusive historical perspectives, and provide deeper meanings regarding the concepts of place and cultural heritage within a community. Another study by Ben (2021) highlights that folklore is an essential tool for understanding local and global cultural expressions, linking oral traditions with contemporary issues such as gender, race, and ethnic identity. This helps enrich the study of cultural traditions in various countries and enhances discussions about sustainability and heritage preservation.

This research is very much needed to overcome the problem of reading literacy in students who are still low. No articles have examined students' literacy skills using Augmented Reality books based on the folklore of Nasrettin Hoca from Turkey. This research is to find new ways to improve reading literacy by emphasizes the integration of folklore with Augmented Reality (AR) technology to enhance student literacy. Through these folk tales, students deepen their understanding of folklore while improving their reading skills, reading comprehension, and understanding of the moral values contained in the stories. This study also investigates how the use of AR books as game-based tools in the classroom affects reading literacy in learning.

## METHOD

### Research Design

This study 2024 using a quasi-experimental design to investigate the effectiveness of AR Book media in enhancing elementary school students' reading literacy skills. The study used a one-group pretest-post-test design, which included experimenting on a single group without a control group (Creswell & Creswell, 2018). All participants received an initial assessment to evaluate their critical reading abilities. They were subsequently given AR Book media, receiving it three times a week for four weeks (12 sessions). After the treatment period, a final assessment was administered to evaluate the participants' reading literacy abilities.

### Participants

The sampling technique used was convenience sampling selected based on the availability of elements and ease of obtaining them at the appropriate place and time. The subjects of the study were 50 elementary school students (20 males and 30 females) who were ten years old. All respondents were taught by a male lecturer with over ten years of teaching experience. He holds a bachelor's degree in Elementary Education and is certified as competent.

### Data Collection

The researchers developed a reading literacy assessment tool specifically designed for elementary school students. The text used during implementation consisted of news articles. The instrument used in this study was adapted from the Organization for Economic Co-operation and Development (Index, 2019), as shown in Table 1. The developed instrument consists of 15 questions. The instrument was completed in 30 minutes.

**Table 1.** Reading Literacy Assessment Instrument

| Subscales | Indicators of Reading Literacy | Aspects Observed |
|---|---|---|
| Text Comprehension Ability | 1. Find information.<br>2. Understand words.<br>3. Understand the main idea. | 1. The student's ability to find precise information in the text, such as answers to specific inquiries, factual data, or significant details.<br>2. The student's comprehension of the text's vocabulary, including unfamiliar or ambiguous words.<br>3. The student's aptitude in understanding the primary idea or theme of the text and establishing connections between relevant ideas within the text. |
| Ability to Analyze Text | 1. Identify the main idea.<br>2. Analyze text structure.<br>3. Understand implicit meaning. | 1. The student's recognition of a text's organization and structure.<br>2. The student's skill in identifying and understanding a text's main concept.<br>3. The student's ability to grasp the underlying meaning of a text. |
| Ability to Evaluate Text | 1. Evaluate the validity and reliability of the information.<br>2. Identify and evaluate arguments.<br>3. Evaluate the author's objectives. | 1. The student's ability to detect and assess information sources within the text.<br>2. The student's ability to perceive arguments or opinions conveyed in the text.<br>3. The student's ability to comprehend the author's intent in composing the text. |

This study made validation of the instruments used to evaluate students' critical reading skills using SPSS 20. Table 2 shows the findings, which revealed that 15 questions fulfilled the required standards. Cronbach's alpha reliability coefficient was 0.83, categorized as very high. The instrument reliability from reading literacy.

**Table 2.** Validity of Reading Literacy Instrument

| Items | Pearson Correlation | Sig. (2-tailed) | Remark |
|---|---|---|---|
| 1 | .747 | .001 | Valid Category |
| 2 | .553 | .003 | Valid Category |
| 3 | .522 | .002 | Valid Category |
| 4 | .877 | .001 | Valid Category |
| 5 | .527 | .002 | Valid Category |
| 6 | .657 | .001 | Valid Category |
| 7 | .683 | .001 | Valid Category |
| 8 | .552 | .002 | Valid Category |
| 9 | .567 | .001 | Valid Category |
| 10 | .656 | .001 | Valid Category |
| 11 | .482 | .002 | Valid Category |
| 12 | .584 | .000 | Valid Category |
| 13 | .628 | .001 | Valid Category |
| 14 | .558 | .004 | Valid Category |
| 15 | .542 | .002 | Valid Category |

**Procedures**

1. Preparing an AR Book of the Nasretin Hoca Folklore

   First, prepare the story of the legend of Nasretin Hoca, integrating it with technology to create an AR (Augmented Reality) Book. The book is equipped with a barcode scan feature that allows the characters in the story to appear virtually.

2. AR Book reading

   Second, invite students to read the AR Book containing folklore. Ensure students have devices that are compatible with AR technology (e.g., smartphones or tablets). Guiding students in using the AR application associated with the book. Encouraging students to read well and discuss the stories presented.



**Figure 1**. Augmented Reality Book Based on Nasrettin Hoca Folklore

3. Interactive AR Explanation

   Third, explain to students the use of AR technology in the book. Demonstrate how to scan images or pages in the book using the AR application to activate interactive elements, such as 3D animations, sounds, or videos that enrich the reading experience.

4. Collaborative Activities

   Fourth, carry out collaborative activities that engage students in examining and improving their comprehension of the presented in the book. For instance, encourage them to generate a presentation or brief narrative using the information acquired from the Augmented Reality (AR) Book.

5. Evaluation and Reflection

   Fifth, evaluate students' reading literacy using AR Book exercises to make students reflect on AR Books themselves and AR technology use.

**Analyzing of Data**

Two initial tests were used to investigate the data: a normality test to confirm data distribution and a homogeneity test to determine the equality of population variance. The data are regularly distributed, according to the analysis utilizing the Kolmogorov-Smirnov Test, which also shows that the significant value ($p = 0.097$) is higher than 0.05. Similar to the previous statement, the Levene test's homogeneity result indicates that the data are homogeneous because the

significant value (p = 0.338) is similarly higher than 0.05. The difference in average scores between the pretest and posttest is calculated using a paired t-test. The N-gain test, on the other hand, gauges the improvement in reading literacy abilities both before and after the intervention.

## RESULTS

### 1. Improve reading literacy toward text comprehension skills

The study used paired t-tests and N-gain scores to assess improvement in students' reading proficiency across various subscales. The outcomes of this analysis are presented in Table 3.

**Table 3.** Reading Literacy on Comprehension Skills

| Text Compre-hension Ability | Paired Differences | | T | df | P | G |
|---|---|---|---|---|---|---|
| | Mean | SD | | | | |
| Find Information | -1.960 | 1.293 | -10.719 | 49 | 0.000 | 0.51 |
| Understand the meaning of words | -1.84 | 1.419 | -9.166 | 49 | 0.000 | 0.58 |
| Understand the main idea | -1.74 | 1.411 | -8.717 | 49 | 0.000 | 0.69 |
| All Subscales | -5.54 | 3.163 | -12.383 | 49 | 0.000 | 0.60 |

The N-gain scores for students' reading comprehension skills are displayed in Table 6. The ability to identify text information scored 0.51, understanding word meanings has a score of 0.58, and comprehending the main idea has a score of 0.69. The scores were categorized as moderate.

### 2. Improve reading literacy toward text analysis skills

Table 4 shows that the ability to effectively analyze textual content, specifically in terms of identifying main ideas is an N-gain score of 0.57. Similarly, the ability to analyze the structure of text is an N-gain score of 0.59.

**Table 4.** Reading Literacy on Text Analysis Skills

| Ability to Analyze Text | Paired Differences | | T | df | P | G |
|---|---|---|---|---|---|---|
| | Mean | SD | | | | |
| Identify the main idea | -1.580 | 1.260 | -8.845 | 49 | 0.000 | 0.57 |
| Analyze text structure | -1.740 | 1.411 | -8.717 | 49 | 0.000 | 0.59 |
| Understand implicit meaning | -1.340 | 1.479 | -6.405 | 49 | 0.000 | 0.67 |
| All Subscales | -4.660 | 3.304 | -9.970 | 49 | 0.000 | 0.61 |

The indicator of comprehending the implicit connotations can be determined by examining the N-gain score, which has been assessed at 0.67 categorized as moderate. This study's results show that the ability to analyze text in reading literacy can be increased through the use of AR books.

### 3. Improve reading literacy toward text assessment skills

Table 5 shows the ability to effectively evaluate text. Table 5 shows the N-gain scores for different skills related to text evaluation.

**Table 5.** Reading Literacy on Text Assessment Skills

| Ability to Evaluate Text | Paired Differences | | T | df | P | G |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | | | | |
| Evaluate the credibility and dependability of the provided information | -1,500 | 1,541 | -6,879 | 49 | 0,000 | 0,46 |
| This task involves the identification and evalua-tion of arguments. | -1,580 | 1,263 | -8,845 | 49 | 0,000 | 0,57 |
| Evaluate the author's objectives | -1,380 | 1,614 | -6,043 | 49 | 0,000 | 0,65 |
| All Subscales | -4,460 | 3,246 | -9,714 | 49 | 0,000 | 0,56 |

The indicator evaluating the reliability and validity of information has a score of 0.46. Identifying and evaluating arguments has a score of 0.57. evaluating the author's purpose has a moderate score of 0.65. Using AR Book can improve the capacity to evaluate text in terms of literacy skills.

## 4.  Paired t-test results for Reading Literacy Skills

The t-test analysis results are discussed in this session. The difference between the pretest and posttest scores was statistically significant in favor of the posttest score (t = -11.515; p = 0.000). Table 6 shows the results of the experiment.

**Table 6.** Paired T-test Results for Reading Literacy Skills

| Scales | Mean | | *SD* | *T* | P |
|---|---|---|---|---|---|
| Text Comprehension Ability | Pre-test | 28.080 | 2.848 | -12.383 | 0.000 |
| | Post-test | 33.620 | 1.455 | | |
| Ability to Analyze Text | Pre-test | 29.100 | 3.221 | -9.97 | 0.000 |
| | Post-test | 33.760 | 1.407 | | |
| Ability to Evaluate Text | Pre-test | 29.160 | 2.852 | -9.714 | 0.000 |
| | Post-test | 33.620 | 1.455 | | |
| All Sub-scales | Pre-test | 86.340 | 8.227 | -11.515 | 0.000 |
| | Post-test | 101.000 | 4.045 | | |

The research results show a significant improvement in students' reading literacy skills after using the Augmented Reality (AR) book based on "Nasretin Hoca" folklore. For text comprehension ability, the pre-test mean score was 28.080 with a standard deviation of 2.848, which increased to 33.620 in the post-test with a standard deviation of 1.455. The t-test value was -12.383 with a p-value of 0.000, indicating a significant difference. Similarly, the ability to analyze text improved from a pre-test mean of 29.100 (SD = 3.221) to a post-test mean of 33.760 (SD = 1.407). The t-value of -9.970 and p-value of 0.000 confirmed this difference as significant. Additionally, for the ability to evaluate text, the mean increased from 29.160 (SD = 2.852) in the pre-test to 33.620 (SD = 1.455) in the post-test, with a t-value of -9.714 and p-value of 0.000. Overall, all sub-scales showed significant improvement, with a t-value of -11.515 and a p-value of 0.000. These findings indicate that the use of AR books has a positive impact on improving students' reading literacy skills.

**DISCUSSION**

Augmented Reality (AR) Books based on improving reading literacy in elementary school students. AR technology makes reading enjoyable and effective (Bursali & Yilmaz, 2019). AR Books can help autistic students read, according to Howorth et al. (2019). AR Books combine 3D animation, sound, and visually presented videos to make reading more engaging and motivating (Billinghurst & Duenser, 2012; Yeh & Tseng, 2020). Elementary school AR Books increase reading literacy by helping students understand the text. Animation and sound help students visualize and hear the material (Bus et al., 2015; C. Lange & Costley, 2020). AR books also engage students in the learning process by letting them explore knowledge and apply it (Abd Halim et al., 2022).

The incorporation of AR Books into literacy learning at elementary schools offers great potential for improving students' depth of text comprehension. Through interactive elements such as animation and sound, students can connect the textual information they read with vivid visual and auditory experiences, thereby enhancing their understanding of the content (Bus et al., 2015; Lange & Costley, 2020). Moreover, the use of AR Books can significantly increase student engagement in the learning process (Hong et al., 2022), as students actively immerse themselves in exploring AR content and relating it to the concepts being taught. Lee (2012) reviewed the articles whose findings show the impact of technological advancements in the field of virtual reality, specifically focusing on AR. The study revealed that AR can enhance students' comprehension and understanding of educational content. The use of engaging and authentic visual content facilitates the process of understanding (Militello et al., 2023; Yilmaz et al., 2017). Students easily comprehend images, feel motivated and entertained, and are more likely to engage in the learning process. AR technology is recognized as a means of integrating the virtual and real worlds through interactive means, as demonstrated by previous studies (Lee, 2012; Monfared et al., 2022; Venkatesan et al., 2021). The integration of AR into storybooks enhances interactivity and falls under the Handheld Display category (Bus et al., 2015).

Several studies provide support for the use of AR Books in elementary schools. Belda and Marrahi (2023) found that AR Books help motivate students to learn languages in school. Nasongkhla (2023) found that AR Books can improve reading skills in Thai primary school children. Gracia (2017) stated that AR Books can encourage Mexican students to read. Schutera et al. (2021) developed an Android application called "cleARmaths" for augmented reality-based mathematics instruction and found that both teachers and students found it useful and enjoyable, indicating the potential of AR in mathematics education. Lubis et al. (2022) examined elementary school students' math anxiety and AR picture storybook media. The experimental group's anxiety levels decreased more than the control group's after using AR image storybooks in math class.

AR Books encourage student collaboration and problem-solving (Ke & Hsu, 2015; Li et al., 2020). Students can collaborate, discuss, and assist each other (Rezende et al., 2017). Students' teamwork and interpersonal skills increase. This study supports Lubis and Wangid's (2019) findings that AR media increases elementary school students' character acquisition and collaboration. Hakam et al. (2022) found that AR multimedia helps primary school students develop character. Elefheria et al. (2013) reported that AR Books improved students'

understanding of the material and increased their enthusiasm for learning. Overall, the use of AR Books in elementary school education offers substantial benefits, including improved reading literacy, interactive learning experiences, increased motivation, and enhanced collaborative learning.

The anticipated improvement in students' reading literacy skills using AR Books can have long-term positive impacts. Good reading literacy skills serve as a crucial foundation for various aspects of student's lives, including overall academic achievement (Hughes & Coplan, 2010). Furthermore, improved reading skills contribute to the development of student's critical thinking skills, enabling them to analyze, evaluate, and interpret information more effectively (Din, 2020). The findings showed that the implementation of AR books has led to enhanced reading comprehension skills among students. Reading literacy significantly impacts one's comprehension of reading material (Ardhian et al., 2020; Chen, 2011). Reading literacy refers to an individual's capacity to effectively access, comprehend, assess, and use the information presented in written materials (Britt et al., 2014; Nur & Abdullah, 2022). Proficient reading literacy' skills enable individuals to comprehend written material, discern crucial information, interpret significance, and establish connections with prior knowledge. In contrast, individuals with limited reading literacy skills are likely to encounter challenges in comprehending the reading material. Reading literacy skills have an impact on student's ability to extract pertinent information and comprehend the conveyed messages in written text (Alneyadi et al., 2023). Good reading literacy skills are crucial for enhancing reading comprehension (Oakhill et al., 2015).

AR Books have been found to enhance students' appeal and engagement in reading (Stanica et al., 2019). An aesthetically pleasing and interactive interface can enhance students' motivation to engage with and comprehend reading materials. Students can engage with a virtual world that is connected to their reading material. This virtual world incorporates augmented reality, allowing students to connect information with visual representations such as images or objects. AR Book can assist students in comprehending intricate concepts (Sungkur et al., 2016). This can help students overcome challenges associated with comprehending abstract or intricate information. The relationship between reading literacy and reading analysis skills holds significant importance for elementary school students. Reading analysis is the skill of deconstructing a text, identifying key information, and making critical judgments (Lloyd, 2004; Plummer et al., 2022). Reading literacy is important for developing reading analysis skills in elementary school. Strong reading literacy improves text comprehension and analysis skills (Sadha et al., 2023). Readers can identify main ideas, and important details, and understand the relationship between information in a text (Qanwal & Karim, 2014). Strong reading skills are crucial for students to understand texts.

Elementary students can improve text engagement by developing reading analysis skills (Anggia & Habók, 2023). Individuals can understand the structure of a written piece, including the introduction, main body, and conclusion. They can identify figurative language and arguments, in the text. Analyzing readings helps students identify details, evaluate arguments, and draw evidence-based conclusions (Stevani & Tarigan, 2022). Analyzing reading skills develops critical thinking and helps differentiate between facts and opinions. It also allows them to ask relevant questions about the text (Cottrell, 2017). AR Books enhance elementary students' text analysis

skills. AR Book improves student engagement and comprehension (Radu, 2014). Adding visual, sound, and animation elements to the AR Book improves students' understanding (Danaei et al., 2020). These features engage students in attending to details, understanding relationships, and analysing text messages. AR Book enhances students' text analysis skills more engagingly and effectively.

Text assessment is a crucial component of reading literacy for elementary school students. Reading literacy includes the ability to comprehend and assess the information presented in written texts (Britt et al., 2014). Proficient reading literacy skills enable students to effectively analyze and evaluate the texts they encounter (Meniado, 2016). Reading literacy instruction teaches students to analyze the reliability, balance, and relevance of information in texts (Pressley et al., 2023). Participants are encouraged to critically analyze and contrast information from multiple sources, while also recognizing potential biases or perspectives within the text (Recasens et al., 2013). Text assessment requires the comprehension of the writer's purpose in communicating information and evaluating the extent to which that intention has been accomplished. Using AR Books in elementary school education can enhance students' text assessment skills (Hung et al., 2017). The inclusion of visual and interactive elements in AR Books allows students to engage more actively in comprehending and assessing texts (Lai et al., 2019). Individuals can evaluate multiple factors when assessing information, including its authenticity, supporting evidence adequacy, and alignment with personal experience and knowledge. The implementation of the AR Book significantly contributes to the student's overall learning experience, as it effectively cultivates and fosters the development of critical thinking and analytical skills through the process of text evaluation.

**CONCLUSION**

In conclusion, the research findings show a notable improvement in students' reading literacy skills using Augmented Reality Books based on "Nasretin Hoca" folklore. This augmentation manifests in improved abilities to comprehend, analyze, and evaluate text content within the medium category. The incorporation of AR technology into the learning process has facilitated the development of students' reading skills more engagingly and effectively. AR Books offer an interactive and immersive reading experience, featuring 3D animation, sound, and video elements that captivate students' attention. In the long term, the use of AR Books can be an effective solution in increasing student literacy in elementary schools. By continually advancing AR technology and incorporating culturally relevant content, AR Books can emerge as innovative and effective educational tools for improving students' language comprehension. The limitations of this study include the use of a sample from only one school and a limited intervention duration, which do not yet reflect the long-term impact of AR Books on students' reading skills more broadly. Future research should be conducted on a larger scale and over a longer duration, while also examining the impact of AR technology on motivation, speaking skills, and digital literacy.

# REFERENCES

Abd Halim, N. D. et al. (2022). Designing Game-Based Learning Kit with Integration of Augmented Reality for Learning Geography. *International Journal of Interactive Mobile Technologies (IJIM)*, 16(02), 4–16.

Alneyadi, S., Abulibdeh, E., & Wardat, Y. (2023). The Impact of Digital Environment vs. Traditional Method on Literacy Skills; Reading and Writing of Emirati Fourth Graders. *Sustainability*, 15(4), 1-15.

Anasi, S. N., Ukangwa, C. C., & Fagbe, A. (2018). University Libraries-Bridging Digital Gaps and Accelerating the Achievement of Sustainable Development Goals Through Information and Communication Technologies. *World Journal of Science, Technology and Sustainable Development*, 15(1), 13–25.

Anderson, M. & Jiang, J. (2018). Teens, Social Media and Technology 2018. *Pew Research Center*, 31(2018), 1673–1689.

Anggia, H. & Habók, A. (2023). Textual complexity adjustments to the English Reading Comprehension Test for Undergraduate EFL Students. *Heliyon*, 9(1), 1-12.

Ardhian, T., Ummah, I., Anafiah, S., & Rachmadtullah, R. (2020). Reading and Critical Thinking Techniques on Understanding Reading Skills for Early Grade Students in Elementary School. *International Journal of Instruction*, 13(2), 107–118.

Bali, M. M. E. I., Najiburrahman, Fathony, A., Salma, Maghfirah, E., & Farida, L. A. (2021). Utilization of Zoom Cloud in M3D (Maze 3D) Game-Based Learning to Develop Early Childhood Social-Emotional Skills. *IOP Conference Series: Materials Science and Engineering*, 1125(1), 1-10.

Belda-Medina, J., & Marrahi-Gomez, V. (2023). The Impact of Augmented Reality (AR) on Vocabulary Acquisition and Student Motivation. *Electronics*, 12(3), 1-17.

Billinghurst, M., & Duenser, A. (2012). Augmented Reality in the Classroom. *Computer*, *45*(7), 56–63.

Blake, R. J. (2008). *Brave new digital classroom: Technology and Foreign Language Learning*. Washington DC: Georgetown University Press.

Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014). Augmented Reality in Education – Cases, Places and Potentials. *Educational Media International*, *51*(1), 1–15.

Britt, M. A., Richter, T., & Rouet, J.-F. (2014). Scientific Literacy: The Role of Goal-Directed Reading and Evaluation in Understanding Scientific Information. *Educational Psychologist*, *49*(2), 104–122.

Bursali, H., & Yilmaz, R. M. (2019). Effect of Augmented Reality Applications on Secondary School Students' Reading Comprehension and Learning Permanency. *Computers in Human Behavior*, *95*, 126–135.

Bus, A. G., Takacs, Z. K., & Kegel, C. A. T. (2015). Affordances and limitations of Electronic Storybooks for Young Children's Emergent Literacy. *Developmental Review*, *35*, 79–97.

Chen, K. Y. (2011). The Impact of EFL Students' Vocabulary Breadth of Knowledge on Literal Reading Comprehension. *Asian EFL Journal*, *51*, 30–40.

Chun, D., Kern, R., & Smith, B. (2016). Technology in Language Use, Language Teaching, and Language Learning. *The Modern Language Journal*, *100*(S1), 64–80.

Cottrell, S. (2017). *Critical Thinking Skills: Developing Effective Analysis and Argument (Palgrave Study Skills)* (4th ed.). London: Bloomsbury Publishing.

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fifth Edit). Thousand Oaks: SAGE Publications Inc.

Danaei, D., Jamali, H. R., Mansourian, Y., & Rastegarpour, H. (2020). Comparing Reading Comprehension Between Children Reading Augmented Reality and Print Storybooks. *Computers & Education*, *153*, 103900.

Din, M. (2020). Evaluating University Students' Critical Thinking Ability as Reflected in Their Critical Reading Skill: A Study at Bachelor Level in Pakistan. *Thinking Skills and Creativity*, *35*, 100627.

Dubois, E., Yuan, X., Bennett Gayle, D., Khurana, P., Knight, T., Laforce, S., Turetsky, D., & Wild, D. (2022). Socially Vulnerable Populations Adoption of Technology to Address Lifestyle Changes Amid COVID-19 in the US. *Data and Information Management*, *6*(2), 1-10.

Eleftheria, C. A. et al. (2013). An innovative Augmented Reality Educational Platform Using Gamification to Enhance Lifelong Learning and Cultural Education. *IISA 2013*, 1–5.

Estapa, A., & Nadolny, L. (2015). The Effect of an Augmented Reality Enhanced Mathematics Lesson on Student Achievement and Motivation. *Journal of STEM Education*, *16*(3), 40-48.

Garcia-Sanchez, J. C. (2017). Augmenting Reality in Books: A Tool for Enhancing Reading Skills in Mexico. *Publishing Research Quarterly*, *33*(1), 19–27.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the Role of Digital Technologies in Education: A Review. *Sustainable Operations and Computers*, *3*, 275–285.

Howorth, S. K., Rooks-Ellis, D., Flanagan, S., & Ok, M. W. (2019). Augmented Reality Supporting Reading Skills of Students with Autism Spectrum Disorder. *Intervention in School and Clinic*, *55*(2), 71–77.

Hughes, K., & Coplan, R. J. (2010). Exploring Processes Linking Shyness and Academic Achievement in Childhood. *School Psychology Quarterly*, *25*(4), 213–222.

Hung, Y.-H., Chen, C.-H., & Huang, S.-W. (2017). Applying Augmented Reality to Enhance Learning: A Study of Different Teaching Materials. *Journal of Computer Assisted Learning*, *33*(3), 252–266.

Index, B. L. (2019). *The Organisation for Economic Cooperation and Development*. U.S Departement of State. https://www.state.gov/the-organization-for-economic-co-operation-and-development-oecd/#:~:text=and Development (OECD)-,The Organization for Economic Co-operation and Development (OECD),to promote sustainable economic growth.

Jamrus, M. H. M., & Razali, A. B. (2019). Augmented Reality in Teaching and Learning English Reading: Realities, Possibilities, and Limitations. *International Journal of Academic Research in Progressive Education and Development*, *8*(4).

Jung, I., & Latchem, C. (2011). A model for e-education: Extended Teaching Spaces and Extended Learning Spaces. *British Journal of Educational Technology*, *42*(1), 6–18.

Kanar, A. M., & Bell, B. S. (2013). Guiding Learners Through Technology-Based Instruction: The Effects of Adaptive Guidance Design and Individual Differences on Learning Over Time. *Journal of Educational Psychology*, *105*(4), 1067–1081.

Ke, F., & Hsu, Y.-C. (2015). Mobile Augmented-Reality Artifact Creation as a Component of Mobile Computer-Supported Collaborative Learning. *The Internet and Higher Education*, *26*, 33–41.

Khan, T., Johnston, K., & Ophoff, J. (2019). The Impact of an Augmented Reality Application on Learning Motivation of Students. *Advances in Human-Computer Interaction*, *2019*, 1, 1–14.

Lai, A.-F., Chen, C.-H., & Lee, G.-Y. (2019). An Augmented Reality-Based Learning Approach to Enhancing Students' Science Reading Performances from the Perspective of the Cognitive Load Theory. *British Journal of Educational Technology*, 50(1), 232–247.

Lange, A. A. (2019). Technology, Instructional Methods, and the Systemic Messiness of Innovation: Improving Reading Fluency for Low Socio-Economic Elementary School Students. *Educational Technology Research and Development*, 67(5), 1333–1350.

Lange, C., & Costley, J. (2020). Improving Online Video Lectures: Learning Challenges Created by Media. *International Journal of Educational Technology in Higher Education*, 17(1), 16.

Lee, K. (2012). Augmented Reality in Education and Training. *TechTrends*, 56(2), 13–21.

Li, J., Spek, E. D. van der, Yu, X., Hu, J., & Feijs, L. (2020). Exploring an Augmented Reality Social Learning Game for Elementary School Students. *Proceedings of the Interaction Design and Children Conference*, 508–518.

Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' Perception of Kahoot!'S Influence on Teaching and Learning. *Research and Practice in Technology Enhanced Learning*, *13*(1), 1-23.

Lipson, H., & Kurman, M. (2016). *Driverless: Intelligent Cars and The Road Ahead* (First Edit). Cambridge: The MIT Press.

Lloyd, S. L. (2004). Using Comprehension Strategies as a Springboard for Student Talk. *Journal of Adolescent & Adult Literacy*, 48(2), 114–124.

Lubis, A. H., Dasopang, M. D., Ramadhini, F., & Dalimunthe, E. M. (2022). Augmented Reality Pictorial Storybook: How Does it Influence on Elementary School Mathematics Anxiety? *Premiere Educandum: Jurnal Pendidikan Dasar dan Pembelajaran*, 12(1), 41-53.

Lubis, A. H., & Wangid, M. N. (2019). Augmented Reality-assisted Pictorial Storybook: Media to Enhance Discipline Character of Primary School Students. *Mimbar Sekolah Dasar*, *6*(1), 11–20.

Meniado, J. C. (2016). Metacognitive Reading Strategies, Motivation, and Reading Comprehension Performance of Saudi EFL Students. *English Language Teaching*, *9*(3), 117.

Militello, L. G., Sushereba, C. E., & Ramachandran, S. (2023). *Handbook of Augmented Reality Training Design Principles*. Cambridge: Cambridge University Press.

Mokyr, J., Vickers, C., & Ziebarth, N. L. (2015). The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? *Journal of Economic Perspectives*, *29*(3), 31–50.

Monfared, M., Shukla, V. K., Dutta, S., & Chaubey, A. (2022). Reshaping Education Through Augmented Reality and Virtual Reality. In *Cyber Intelligence and Information Retrieval: Proceedings of CIIR 2021*, 619–629. Springer Singapore.

Mutohhari, F., Sutiman, S., Nurtanto, M., Kholifah, N., & Samsudin, A. (2021). Difficulties in Implementing 21st Century Skills Competence in Vocational Education Learning. *International Journal of Evaluation and Research in Education (IJERE)*, *10*(4), 1229-1236.

Narang, R., & Tiwari, S. (2024). Role of Modern Technology in Unorganized Retail Sector. *Journal of the Knowledge Economy*, 1-28.

Nasongkhla, J., & Sujiva, S. (2023). Enhancing Reading Capability Of Young Thai Students With Augmented Reality Technology: Design-Based Research. *Contemporary Educational Technology*, *15*(1), 1-16.

Nur, A., & Abdullah, M. S. (2022). Barru Literacy Community as the Alternative Literacy Movement: A Study on Cultivating Reading Literacy toward Society in Barru Regency, South Sulawesi Province. *Salus Cultura: Jurnal Pembangunan Manusia Dan Kebudayaan*, *2*(1), 11–25.

Oakhill, J., Cain, K., & Elbro, C. (2015). *Understanding and Teaching Reading Comprehension: A handbook* (1st editio). Oxfordshire: Routledge.

Oun, L. S. (2018). *Connecting the Disconnected: How Technology can Accelerate Human Progress*. Chicago Policy Review (Online). https://chicagopolicyreview.org/2018/02/02/connecting-the-disconnected-how-technology-can-accelerate-human-progress/.

Oztemel, E., & Gursev, S. (2020). Literature review of Industry 4.0 and Related Technologies. *Journal of Intelligent Manufacturing*, *31*(1), 127–182. https://doi.org/10.1007/s10845-018-1433-8.

Plummer, K. J., Kebritchi, M., Leary, H. M., & Halverson, D. M. (2022). Enhancing Critical Thinking Skills through Decision-Based Learning. *Innovative Higher Education*, *47*(4), 711–734.

Pressley, T., Allington, R. L., & Pressley, M. (2023). *Reading Instruction that Works: The case for balanced teaching* (4th Editio). New York: Guilford Publications.

Qanwal, S., & Karim, S. (2014). Identifying Correlation between Reading Strategies Instruction and L2 Text Comprehension. *Journal of Language Teaching and Research*, *5*(5), 1019-1032.

Radu, I. (2014). Augmented Reality in Education: A Meta-Review and Cross-Media Analysis. *Personal and Ubiquitous Computing*, *18*(6), 1533–1543.

Recasens, M., Danescu-Niculescu-Mizil, C., & Jurafsky, D. (2013). Linguistic Models for Analyzing and Detecting Biased Language. *Proceedings of the 51st Annual Meeting of the Association for Computational Linguistics*, 1650–1659.

Rezende, W. J., Albuquerque, E. S., & Ambrosio, A. P. (2017). Use of Augmented Reality to Support Education - Creating a Mobile E-learning Tool and using it with an Inquiry-based Approach. *Proceedings of the 9th International Conference on Computer Supported Education*, 100–107.

Robinson, K. (2016). The Effect of Technology Integration on High School Students'literacy

Achievement. *Teaching English with Technology*, *16*(3), 3–16.

Sadha, M. S., Novitri, N., & Syarfi, M. (2023). The Correlation between Social Media Usage and Reading Ability of English Department Students at University. *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, *10*(2), 2201–2210.

Schutera, S., Schnierle, M., Wu, M., Pertzel, T., Seybold, J., Bauer, P., Teutscher, D., Raedle, M., Heß-Mohr, N., Röck, S., & Krause, M. J. (2021). On the Potential of Augmented Reality for Mathematics Teaching with the Application cleARmaths. *Education Sciences*, *11*(8), 1-18.

Septinaningrum, Hakam, K. A., Setiawan, W., & Agustin, M. (2022). Developing of Augmented Reality Media Containing Grebeg Pancasila for Character Learning in Elementary School. *Ingénierie Des Systèmes d Information*, *27*(2), 243–253.

Stanica, I.-C., Moldoveanu, A., Dascalu, M., Moldoveanu, F., Radoi, M., & Nemoianu, I. V. (2019). Emergent Technologies to Enrich Reading Outcomes Through Augmented Reality. *Revue Roumaine Des Sciences Techniques, Série Électrotechnique et Énergétique*, *64*(1), 95–100.

Stevani, M., & Tarigan, K. E. (2022). Evaluating English Textbooks by Using Bloom's Taxonomy to Analyze Reading Comprehension Question. *SALEE: Study of Applied Linguistics and English Education*, *4*(1), 1–18.

Sungkur, R. K., Panchoo, A., & Bhoyroo, N. K. (2016). Augmented Reality, The Future of Contextual Mobile Learning. *Interactive Technology and Smart Education*, *13*(2), 123–146.

Thorne, S. L., & Reinhardt, J. (2008). "Bridging Activities," New Media Literacies, and Advanced Foreign Language Proficiency. *CALICO Journal*, *25*(3), 558–572.

Tîrziu, A.-M., & Vrabie, C. (2015). Education 2.0: E-Learning Methods. *Procedia - Social and Behavioral Sciences*, *186*, 376–380.

Venkatesan, M., Mohan, H., Ryan, J. R., Schürch, C. M., Nolan, G. P., Frakes, D. H., & Coskun, A. F. (2021). Virtual and Augmented Reality for Biomedical Applications. *Cell Reports Medicine*, *2*(7), 1-13.

Wang, M., Callaghan, V., Bernhardt, J., White, K., & Peña-Rios, A. (2018). Augmented Reality in Education and Training: Pedagogical Approaches and Illustrative Case Studies. *Journal of Ambient Intelligence and Humanized Computing*, *9*(5), 1391–1402.

Warschauer, M., & Liaw, M.-L. (2011). Emerging Technologies for Autonomous Language Learning. *Studies in Self-Access Learning Journal*, 2(3), 107–118.

Yeh, H.-C., & Tseng, S. S. (2020). Enhancing Multimodal Literacy Using Augmented Reality. *Language, Learning and Technology*, *24*(1), 27–37.

Yilmaz, R. M., Kucuk, S., & Goktas, Y. (2017). Are Augmented Reality Picture Books Magic or Real for Preschool Children Aged Five To Six? *British Journal of Educational Technology*, *48*(3), 824–841.