DEVELOPMENT OF DIGITAL STORYBOOK ON SDG-2 TO FACILITATE READING BEHAVIOURAL ENGAGEMENT OF FIFTH GRADE STUDENTS AT SD MUTIARA

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PERNYATAAN

Dengan ini saya menyatakan bahwa skripsi yang berjudul "Development of Digital Storybook on SDG-2 to Facilitate Reading Behavioural Engagement of Fifth grade Students at SD Mutiara" beserta seluruh isinya merupakan karya saya sendiri, dan saya tidak melakukan penjiplakan dan mengutip dengan cara-cara yang tidak sesuai dengan kaidah dan etika yang berlaku dalam karya ilmiah. Atas pernyataan ini, saya siap menanggung risiko yang dijatuhkan pada saya apabila di kemudian hari ditemukan adanya pelanggaran atas etika keilmuan dalam skripsi saya.

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ABSTRACT

Reading literacy plays an important role in supporting students' academic achievement and lifelong learning. However, many students in Indonesia still face difficulties in reading, as indicated by the results of the Program for International Student Assessment (PISA) 2022. One of the contributing factors is students' low reading behavioural engagement. To address this issue, previous studies have developed digital storybooks; however, most of them focus either on multimedia features or story content separately, without integrating both aspects effectively. Furthermore, incorporating meaningful themes such as Sustainable Development Goal (SDG) 2: Zero Hunger into reading media is essential to promote students' awareness of sustainability while enhancing their engagement in reading activities. Therefore, this study aimed to analyze, design, develop, and evaluate a digital storybook based on SDG-2 to facilitate the reading behavioural engagement of fifth-grade students at SD Mutiara. This study employed a Design and Development (DnD) approach using the ADDE model. Data were collected through observation and interviews involving fifth-grade students and their teacher, while product evaluation was conducted through expert judgment involving two experts and one teacher using a checklist. The collected data were analyzed using qualitative and quantitative methods. The findings revealed that: (1) students required more engaging, interactive, and meaningful reading media; (2) the digital storybook was designed based on students' and teacher's needs by integrating the SDG-2 theme and utilizing appropriate digital media and interactive features; (3) the developed product was categorized as excellent based on expert evaluations regarding digital storybook criteria and SDG-2 learning objectives; and (4) the product was categorized as good in facilitating students' reading behavioural engagement based on the teacher's assessment. These findings indicate that the developed digital storybook achieved excellent quality and has the potential to facilitate the reading behavioural engagement of fifth-grade students.

Keywords: *Digital Storybook, Digital Reading media, SDG-2, Reading Behavioural Engagement*

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ABSTRAK

Literasi membaca memainkan peran penting dalam mendukung prestasi akademik siswa dan pembelajaran sepanjang hayat. Namun, banyak siswa di Indonesia masih menghadapi kesulitan dalam membaca, seperti yang ditunjukkan oleh hasil *Program for International Student Assessment* (PISA) 2022. Salah satu faktor penyebabnya adalah rendahnya keterlibatan perilaku membaca siswa. Untuk mengatasi masalah ini, penelitian sebelumnya telah mengembangkan buku cerita digital; namun, sebagian besar hanya berfokus pada fitur multimedia atau konten cerita secara terpisah, tanpa mengintegrasikan kedua aspek tersebut secara efektif. Lebih lanjut, memasukkan tema-tema bermakna seperti Tujuan Pembangunan Berkelanjutan (SDG) 2: *Zero Hunger* ke dalam bahan bacaan sangat penting untuk meningkatkan kesadaran siswa tentang keberlanjutan sekaligus meningkatkan keterlibatan mereka dalam kegiatan membaca. Oleh karena itu, penelitian ini bertujuan untuk menganalisis, merancang, mengembangkan, dan mengevaluasi buku cerita digital berbasis SDG-2 untuk memfasilitasi keterlibatan perilaku membaca siswa kelas lima di SD Mutiara. Penelitian ini menggunakan pendekatan Desain dan Pengembangan (DnD) dengan model ADDE. Data dikumpulkan melalui observasi dan wawancara yang melibatkan siswa kelas lima dan guru mereka, sedangkan evaluasi produk dilakukan melalui penilaian ahli yang melibatkan dua ahli dan satu guru menggunakan daftar periksa. Data yang dikumpulkan dianalisis menggunakan metode kualitatif dan kuantitatif. Hasil penelitian menunjukkan bahwa: (1) siswa membutuhkan materi bacaan yang lebih menarik, interaktif, dan bermakna; (2) buku cerita digital dirancang berdasarkan kebutuhan siswa dan guru dengan mengintegrasikan tema SDG-2 dan memanfaatkan media digital serta fitur interaktif yang sesuai; (3) produk yang dikembangkan dikategorikan sebagai sangat baik berdasarkan evaluasi ahli mengenai kriteria buku cerita digital dan tujuan pembelajaran SDG-2; dan (4) produk tersebut dikategorikan sebagai baik dalam memfasilitasi keterlibatan perilaku membaca siswa berdasarkan penilaian guru. Temuan ini menunjukkan bahwa buku cerita digital yang dikembangkan mencapai kualitas yang sangat baik dan berpotensi untuk memfasilitasi keterlibatan perilaku membaca siswa kelas lima.

Kata Kunci: *Buku cerita digital, bahan bacaan digital, SDG-2, Keterlibatan Perilaku membaca*

CHAPTER I

INTRODUCTION

1.1 Research Background

One of the important skills that must be possessed by humans in this life is the ability to read. The ability to read and write (literacy) of a person is certainly different for each individual depending on how long their experience is. Especially in 2022 Indonesia's PISA (Program for International Student Assessment) score, ranked 69 out of 80 total countries listed. With a reading score of only 359. This shows the need for literacy in Indonesia to increase. Early literacy development is crucial as it helps students succeed in school and build their social skills. When students engage in reading activities during elementary school, it significantly impacts their long-term literacy skills. According to the study, reading is a fundamental skill that enhances comprehension, communication, cognitive development, and also can increase student engagement and motivation in reading (Sara., 2021). Early exposure to reading, prepares students for better academic achievements and encourages a deeper understanding of the world around them making lifelong learning and exploration (Rawian et al., 2022)

Since it covers children's motivation, excitement, and active participation in reading activities, reading engagement is a crucial component of literacy development, particularly in primary school. Active readers are more likely to develop a lifelong love of reading, improve their vocabulary, and develop strong comprehension skills. Reading engagement enhances

students' understanding of texts and fosters the development of critical thinking and analytical skills, all of which are essential for academic success (Sudatha et al., 2024). Additionally, Lailiyah et al. (2022), demonstrate that students who are actively reading are more likely to engage in discussions and collaborative learning, which leads to a deeper understanding of the subject. Its importance is demonstrated by the impact that reading engagement has on students' overall academic achievement. According to research, students who read a lot do better in a variety of subjects. Furthermore, fostering a lifetime love of reading at an early age is linked to a number of social and cognitive advantages (Siregar et al., 2022). Therefore, teachers need to create an environment that supports reading behavioural engagement if they seek to enhance literacy results and help students develop a love of reading.

The behavioural of reading habits among students in Indonesia are generally low due to students' interest in digital entertainment over reading (Wiranatha & Santosa, 2024). Based on interviews and preliminary observations at Mutiara Elementary School students often face challenges in reading textbooks, as it is difficult to understand, students also show less focus and usually talk to their friends. Elementary schools often face challenges in reading engagement due to their limited attention spans which makes students less focused on reading within a certain time (Husnah et al., 2024). And also the need for interactive and visually stimulating materials. The study highlights that young learners require engaging content to maintain their interest and motivation in reading (Rawian et al., 2022). Interactive

storytelling and colourful illustrations are essential to capture their attention and enhance their reading experience, which is often lacking in traditional reading materials. Furthermore, the development of digital storybooks as engaging supplementary reading media needs to be done to seek a better result for students' reading.

Digital storybooks have emerged as a useful tool for improving early reading experiences in young learners (Indriani & Suteja, 2023). These interactive materials mix exciting text with colorful pictures to capture children's attention and encourage their love of reading. The use of digital storybooks, often in the form of an app or website, allows for a multisensory approach to literacy in which children can not only read the text but also interact with the story through animations and often include with sound effects, making the reading experience more enjoyable (Son & Butcher, 2024). According to research, digital storybooks are able to significantly increase children's reading comprehension and motivation by providing a dynamic platform that stimulates active engagement (Kuo, 2021). Furthermore, the interactive nature of digital storybooks supports diverse learning styles, providing to students with engaging learning styles, all of which are important in early literacy development. Due to this potential, digital storybooks can be an effective means of instilling various important values among young learners, including sustainable development issues that are familiar for them which are align with the Sustainable Development Goals (SDGs).

Integrating Sustainable Development Goals (SDGs) into reading media is an effective strategy for fostering early awareness of sustainability among young learners. By connecting educational content to real-world issues, teachers can help children understand the importance of sustainability in their daily lives and develop a sense of responsibility (Cordova, 2024). Incorporating themes related to environmental, social, and cultural sustainability allows educators to provide a comprehensive understanding of global challenges. This approach not only enhances literacy skills but also encourages critical thinking and problem-solving, empowering children to become active participants in their communities (Stahl et al., 2023). Ultimately, integrating SDGs into reading media prepares young learners to face future challenges with knowledge, empathy, and a commitment to sustainability.

Among the 17 Sustainable Development Goals, SDG-2 (Zero Hunger) is considered highly relevant for elementary school especially for fifth-grade students at Mutiara Singaraja elementary school because it addresses basic human needs that children can easily understand and experience in their daily lives (Mulero et al., 2024). Besides that, from teacher interviews stated that topic such as food are closely related to fifth-grade students' as it along with one of the materials in their English subject. Compared to other SDGs, SDG-2 provides concrete and familiar contexts that can be meaningfully explored through storybook, making it suitable for young learners with limited abstract thinking abilities (Reyes et al., 2025).

SDGs-based storytelling is important in early childhood education because it raises environmental, social, and cultural awareness. By integrating SDG-2 into storybooks, children can get a basic awareness of how hunger impacts individuals and communities throughout the world by listening to stories that emphasize the significant of food security, nutrition, and sustainable agriculture (Grosso et al., 2020). For example, stories depicting the route of food from farm to table can highlight the interdependence of environmental health, social equality, and food-related cultural behaviours (Stahl et al., 2023). By investigating various cultural views on food and nutrition, students may get a better understanding of the importance of local food systems and the effect of global concerns on their own communities (Stahl et al., 2023). Furthermore, storytelling fosters empathy and critical thinking, encouraging childrens to explore their roles in combating poverty and supporting sustainable behaviours (Gedzune, 2014). This strategy not only improves reading skills, but also enables young students to become educated and responsible global citizens who understand the necessity of maintaining food security for all. Finally, SDGs-based storytelling especially SDG-2 in early school creates the framework for a generation that prioritizes environmental sustainability, social justice, and cultural diversity in the battle against hunger.

Based on earlier discussion and previous studies related to low student literacy and also the results of preliminary observations, this study develop a digital storybook based on SDG-2 to facilitate English reading behavioural engagement of fifth grade students at SD Mutiara Singaraja. This

study addresses the unavailability of reading media that are appropriate to the student's level and addresses reading behavioural engagement of elementary school students.

1.2 Problem Identification

Through teacher interviews and preliminary classroom observations at SD Mutiara, several challenges related to English reading behavioural engagement have been identified. The most prominent issue is the lack of interest in reading independently. Many students show low behavioural engagement when engaging with English reading materials, which are often perceived as less appealing or difficult to relate to their daily lives. This lack of behavioural engagement affects their overall reading comprehension and ability to enjoy the reading process.

Another issue is students' low focus during reading activities. Instead of concentrating and do the reading task on the text, many students tend to talk with their peers and easy to get distracted in the classroom. This behavioural reduces the effectiveness of reading lessons, as students do not fully engage with the material or understand its content.

The teacher also noted that one contributing factor to this is the absence of reading materials that are interactive, visually engaging, and relevant to students' real-world experiences and students teaching materials used by the teacher rely solely on LKS (student worksheets). This limited use of instructional materials reduces students' exposure to more engaging and varied reading resources, such as storybooks or interactive texts. As a result,

reading activities tend to feel monotonous and less meaningful, which can decrease students' interest and active engagement in reading.

1.3 Limitation of the Problem

1 Scope of the study:

This study focuses on the development and evaluation of a digital storybook specifically designed for fifth-grade elementary school in order to create an engaging reading experience and encourage active reading behaviour. This innovation lies in the integration of thematic content aligned with Sustainable Development Goal (SDG) 2: Zero Hunger theme within the story narrative. By combining literacy development with global citizenship education, this digital storybook aims to address only their reading behavioural engagement through only one trial session and also internalize values related to sustainable living.

2 Age Group:

The target audience for this research is fifth-grade elementary school students. At this stage, children are developing basic reading habits and the ability to connect text to real-world concepts. This makes them an ideal group to introduce SDG-based content, as they are able to understand moral lessons while still enjoying the interactive, story-based format. Therefore, the digital storybook design incorporated age-appropriate language, illustrations, and interactive elements to maintain their interest while supporting reading comprehension and behavioural engagement.

3 Focus Areas:

This research focuses on two aspects. First, it explores the potential of a digital storybook to support students' reading behavioural engagement through their participation, attention, effort, persistence, and interaction with the text during one session trial reading activities. Second, it integrates SDG-2: Zero Hunger concepts into the digital storybook to introduce students to issues related to hunger, food sharing, and access to food. Through this integration, the digital storybook is designed to provide meaningful reading experiences that connect literacy activities with sustainability-related themes.

4 Geographical location:

Geographically, this research was conducted at Mutiara Elementary School in Singaraja, Bali that provides a rich cultural and educational background for integrating relevant local examples into the storybook content. By situating the research within a specific community, the research ensured contextual relevance, as the themes and scenarios in the digital storybooks could reflect the students' lived experiences. This local approach increased the likelihood of sustained engagement and practical application of the values promoted through the stories.

1.4 Research Question

1 What are the needs of grade fifth students and teacher regarding materials that integrate SDG-2 to facilitate reading behavioural engagement?

2 How can a digital storybook integrating SDG-2 be designed and developed to support grade fifth students' reading behavioural engagement?

3 How is the quality of the developed SDG-2 digital storybook, as evaluated by experts, in terms of content, design, and relevance to literacy and sustainability education?

4 How is the quality of the developed SDG-2 digital storybook, as evaluated by teachers, in terms of students reading behavioural engagement?

1.5 Research Objective

1. To identify the needs of grade fifth students and teacher reading media that integrate SDG-2 to facilitate reading behavioural engagement.
2. To design and develop a digital storybook integrating SDG-2 to support grade fifth students reading behavioural engagement.
3. To evaluate the quality of the developed SDG-2 digital storybook, as assessed by experts, in terms of content, design, and relevance to literacy and sustainability education.
4. To evaluate the quality of the developed SDG-2 digital storybook, as assessed by teacher, in terms of students reading behavioural engagement.

1.6 Research Significance

This study has two significances, that are theoretical and practical significant:

1. Theoretical significant:

This study contributes to the field of literacy and English language learning by developing a digital storybook that integrates Sustainable Development Goals (SDGs) themes. It demonstrates the potential of digital storybooks to encourage reading behavioural engagement while introducing global issues to young learners. The findings of this study provide additional insights into the use of technology-based learning materials, literacy instruction, and educational technology in elementary school settings.

2. Practical Significant:

   a. For teacher

      This study provides educators with practical guidance on integrating sustainability themes into English lessons through digital storytelling. It also offers examples of how digital storybooks can be used not only to support language learning but also to promote character development and global awareness among students.

   b. For students

      Digital storybooks that are interactive and appropriate for students' interests and cognitive abilities are beneficial. In addition to encouraging reading engagement, the materials help them comprehend SDG-2 Zero Hunger, which promotes meaningful learning that goes beyond language proficiency.

   c. For researcher

      The findings of this study provide insights into the use of digital media, particularly digital storybooks, to support reading

behavioural engagement and awareness of global issues. In addition, this study may serve as a reference for future researchers interested in developing and evaluating similar educational reading media, especially in the areas of literacy, digital learning resources, SDG integration, and reading behavioural engagement among young learners.

CHAPTER II

LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 The Urgency of Literacy Development in Indonesia

2.1.1.1 Definition of Literacy

The capacity to read, write, and engage with language effectively are all components of literacy, which is a fundamental talent. Reading texts is only one aspect of literacy another is comprehending and evaluating information critically. Particularly associated with Cognitive Development theory by Jean Piaget stated that the concrete operational stage (7 to 11 years) students, in which logical reasoning builds but is limited to concrete objects (Sidik, 2020).

For young students in non-native English-speaking nations like Indonesia, where English is taught at a young age to develop foundational abilities, literacy in English as a Foreign Language (EFL) is especially crucial (Suhardiana et al., 2023). According to Trilling and Fadel, literacy is seen as a fundamental element of 21st century abilities, which are necessary for negotiating the complexity of the contemporary world (Kivunja, 2014). Proficiency in reading and writing a foreign language can enhance students' cognitive capacities and equip them for international communication.

2.1.1.2 Challenges of young learner literacy in Indonesia

The successful implementation of literacy education programs for young learners is faced by a number of challenges. Students struggle with word and sentence-level pronunciation of letters, vowels, and tones throughout implementation attempts (Yulianti et al., 2025). According to Mesmer (2024), the students also fail to comprehend the meaning of the words they read. Teaching young learners offers challenges due to a number of factors, including student participation ignorance, hesitation, and laziness, along with to their low capacity for learning (Maulana & Fahriany, 2025). Thus, challenges to literacy development in the context of young learners include poor awareness and enthusiasm for learning, difficulties reading, and a lack of word knowledge.

2.1.1.3 Current Situation of Literacy in Indonesia

According to the results of the 2022 PISA (Program for International Student Assessment), Indonesia is rated 69th out of 80 nations, indicating that the country's literacy levels are still low. Due to time restrictions, a lack of reading resources, and a decrease in teacher commitment to reading activities, fundamental literacy planning is not fully implemented, which results in low literacy (Saparuddin et al., 2025). Additionally, the low literacy rate in Indonesia is partly a result of the country's general use of computers and cellphones for entertainment rather than education (Wiranatha & Santosa, 2024). So, the current situation in Indonesia, Low literacy rates are caused by incomplete literacy planning, limited facilities, low student motivation,

and misuse of technology. These factors hinder effective literacy development in schools and homes.

2.1.2 Reading skills for young Learners

2.1.2.1 Definition of Reading Skills

The process of comprehending the meaning of letters, symbols, and various elements is called reading. Rumelhart (1985) defines reading as a comprehensive and interactive cognitive activity that includes the identification, interpretation, and comprehension of written symbols. The process of incorporating words into text by identifying letter structures and comprehending a word's meaning is another definition of reading (Perfetti & Stafura, 2014). Furthermore, reading is defined as a complex, meaning-focused activity that incorporates composition, language comprehension, and decoding (Nation, 2019). Therefore, Reading is a complex cognitive activity that involves understanding written material through language processing, symbol identification, and comprehension depending on the reader's prior knowledge.

Reading is not limited to recognizing written words, it also requires readers to actively construct meaning by interpreting information and making connections between ideas. According to the Simple View of Reading, successful reading comprehension depends on two main components: decoding skills and language comprehension. Decoding enables readers to recognize and pronounce written words,

while language comprehension allows them to understand the meaning conveyed by those words and sentences (Gough & Tunmer, 1986).

For young learners, reading skills develop gradually through exposure to meaningful texts and reading experiences. Effective reading activities help learners expand their vocabulary, improve comprehension, develop critical thinking, and increase their motivation to read (Hasanzade, 2025). Therefore, reading can be understood as a complex cognitive process that involves decoding written symbols, comprehending language, and constructing meaning based on the reader's prior knowledge and experiences.

In the context of this study, reading skills are related to students' ability to understand and engage with the content presented in the digital storybook. The storybook provides opportunities for students to interact with written texts, visual elements, and contextual information, which may support their reading development and reading behavioral engagement.

2.1.2.2 Dimension of Reading Engagement

Reading engagement refers to students' active involvement in reading activities and is often viewed as a multidimensional construct. According to Guthrie (2004) reading engagement consists of behavioral, emotional, cognitive, and social dimensions. Behavioral engagement is reflected in students' participation, effort, persistence, and attention during reading activities. Emotional engagement relates to students' interest, enjoyment, and positive attitudes toward reading.

Cognitive engagement involves the use of reading strategies, critical thinking, and self-regulation to construct meaning from texts. Social engagement refers to interactions with others during reading, such as discussing texts, sharing ideas, and responding to questions.

These dimensions work together to support successful reading experiences. Reading extends beyond recognizing words and reading fluently; it also involves understanding text meaning, developing vocabulary knowledge, and applying appropriate reading strategies (Taye & Teshome, 2025). Young learners should be encouraged to monitor their understanding, ask questions, and connect textual information with their own experiences (Ackermans et al., 2025). Such abilities are related to metacognitive awareness, which enables learners to regulate their thinking processes and select strategies to improve comprehension (Ciprianová & Čujdíková, 2025).

As students' progress through higher grade levels, they are expected to read with specific purposes and critically evaluate information. Therefore, reading instruction should not focus solely on decoding skills but also support students in constructing meaning, reflecting on texts, and engaging in higher-order thinking. Reading is recognized as a complex and interactive process that requires fluency, comprehension, strategic thinking, and active engagement (FLUERAȘ, 2024). It also involves utilizing prior knowledge, adapting reading strategies, and evaluating the credibility of information while drawing on linguistic knowledge such as vocabulary, grammar, and text

structure (Belouiza et al., 2024; Hamid et al., 2020). Consequently, effective reading instruction should foster students' behavioral, emotional, cognitive, and social engagement to support meaningful and successful reading experiences.

2.1.2.3 Reading Behavioural Engagement

Behavioural engagement reflects students' observable involvement in reading activities. It is commonly indicated by the attention, effort, and persistence that students demonstrate while reading (Fredricks et al., 2004; Guthrie, 2004; McGeown & Smith, 2024). Attention refers to students' ability to focus on reading tasks and maintain concentration throughout the activity. Effort is reflected in the willingness to invest time and energy in reading, even when the text is challenging. Persistence refers to students' ability to continue reading and complete reading tasks despite difficulties or distractions. These observable behaviours indicate the extent to which students actively participate in the reading process.

Research by Sudatha et al. (2024) suggests that reading engagement involves cognitive, emotional, and behavioural dimensions that collectively influence students' reading experiences and learning outcomes. Within this framework, behavioural engagement represents the visible actions that demonstrate students' involvement in reading, such as participating in reading activities, completing reading assignments, spending time reading, and interacting with texts. Students who display higher levels of behavioural engagement are

generally more likely to develop positive reading habits and gain greater benefits from reading activities.

Furthermore, the School Literacy Movement in Indonesia emphasizes the importance of behavioural engagement by integrating reading activities into daily school routines (Prawira et al., 2023). Through regular reading practices, students are encouraged to develop consistent reading habits and greater interest in reading. This initiative highlights the role of active participation and sustained involvement in fostering a reading culture among students. Therefore, reading behavioural engagement can be understood as students' observable participation in reading activities, reflected through their attention, effort, persistence, reading frequency, and involvement in reading tasks. These behaviours serve as important indicators of students' engagement with reading and their potential development as active readers.

2.1.2.4 Teaching Reading for young Learner in Promoting Their Behavioural Engagement

Enhancing reading engagement among young learners can be based on Sociocultural Theory, which emphasizes that learning occurs most effectively within the Zone of Proximal Development (ZPD), the gap between what learners can do independently and what they can achieve with appropriate guidance. Efficient reading Enhancing student engagement, which encompasses behavioural, cognitive, and emotional aspects, is mostly dependent on instructional methods. In order to make sure that reading activities occur within the range of challenges students

may overcome, it is crucial to adapt reading assignments to their zone of proximal development (ZPD) (Murray & Arroyo, 2002).

Furthermore, students reading abilities and engagement can be greatly enhanced by interactive read-aloud activities, particularly those that emphasize critical literacy techniques (Istihari, 2024). Strategies that incorporate physical, audio, and visual components are highly successful in raising young students' reading engagement by using techniques like digital storybooks, phonics games, interactive storytelling, and small group reading circles (Hasanzade, 2025). Therefore, by integrating visual, auditory, and kinesthetic aspects and by making reading activities relevant and appropriate for their level of ability, successful reading techniques assist in raising student engagement.

2.1.2.5 Needs Analysis on Reading Needs and Engagement

In the field of language education, identifying learners' needs is a fundamental step in the development of effective instructional materials. According to Hutchinson & Waters (1987), needs are not viewed as a static concept; rather, they are shaped by the specific learning context and the objectives that learners are expected to accomplish. This view suggests that needs analysis should take into account both learners' present situations and the future demands they may encounter. From a learning-centered perspective, teaching materials should be developed based on learners' goals and the ways in

which they learn most successfully (Hutchinson & Waters, 1987). In general, learner needs can be classified into two primary categories.

a) Target needs

Target needs refer to the knowledge and abilities that learners are expected to acquire in order to perform effectively in academic or real-life contexts. These needs encompass necessities, which are the skills and competencies learners must develop lacks, which represent the gaps between learners' current abilities and the required competencies. Wants, which reflect learners' perceptions of what they need to learn.

b) Learning needs

What students require in order to learn successfully is referred to as their learning requirements. This covers elements like learning preferences, motivation, and the types of resources or activities that keep students interested.

Supporting this perspective, Grabe & Stoller (2020) identify reading as a fundamental component of education. They argue that reading is not an ability that develops naturally but a skill that requires systematic instruction and continuous practice. Reading is essential for academic learning, vocabulary acquisition, and the development of independent learning skills. Furthermore, successful reading development depends on several key elements, including reading fluency, comprehension, and motivation, all of which should be fostered through appropriate instructional materials and meaningful

learning experiences. When viewed together, the theories of Hutchinson & Waters (1987) and Grabe & Stoller (2020) provide a comprehensive framework for understanding reading as both a learning objective and a learning process. Hutchinson & Waters (1987) emphasize the importance of examining what learners need to achieve and the learning conditions required to help them reach those goals. In contrast, Grabe & Stoller (2020) highlight the broader significance of reading in supporting language development, academic achievement, and personal growth. Therefore, reading instruction should be designed to address both learners' target needs and learning needs through materials and activities that are relevant, engaging, and aligned with their characteristics

2.1.3 Digital Storybooks

2.1.3.1 Definition of Digital Storybook

Storybooks are essential elements of children's reading that support the development of literacy, including picture books and narrative texts. They are essential for improving comprehension abilities and offer rich contexts for language acquisition. Storybooks provide children to a variety of narrative forms, language, and topics that are critical to their linguistic and cognitive development (Horst & Houston-Price, 2015). Children's engagement and understanding are improved by the interactive aspect of storybooks, particularly when paired with asking questions and encouraging children to talk about the story (Xu et al., 2021). Additionally, storybooks are important for

encouraging a love of reading. According to Pulimeno (2020) children's literature educates social values and helps them deal with real-life problems in besides providing enjoyment. Children's relationships with fictional characters and stories might inspire them to read more, which eventually help them become more competent. Furthermore, using storybooks in the classroom can foster a love of reading and inspire children to pursue literature on their own.

2.1.3.2 Kind of Digital Storybook

The development of digital storybooks has progressed considerably over time, largely driven by rapid advancements in multimedia technology and the increasing exposure of children to digital environments. As digital storytelling has evolved, researchers have classified digital storybooks based on their design features, functionality, and degree of interactivity. According to Mascarenhas and Rolo (2022), digital storybooks can be understood through a developmental framework consisting of four stages. The earliest stage consisted of digital storybooks that functioned primarily as electronic versions of printed books. Although presented in digital format, these storybooks retained the same structure, content, and reading experience as their printed counterparts. Their main advantage was improved accessibility and convenience; however, they offered limited opportunities for interaction and multimodal engagement. The next stage introduced animated digital storybooks, which incorporated motion effects, animations, and automatic transitions to enhance the

storytelling experience. While these features increased the visual appeal of the stories, they also reduced readers' control over the pace and navigation of the content.

At the most advanced stage of development, digital storybooks incorporate interactive features that extend beyond the narrative itself, including games, quizzes, personalization options, and activities that encourage physical interaction (Bus et al., 2025). These features promote active reader participation by allowing users to engage with story elements, influence content navigation, and interact directly with the learning material rather than passively receiving information. Similarly, (Takacs et al., 2015) classify digital storybooks based on their technical formats and multimedia capabilities, including static formats such as PDF, web-based HTML books, and reflowable EPUBs that support responsive design and dynamic content. Among these formats, EPUB-based digital books are particularly beneficial for young learners because they can be accessed across multiple devices and integrate multimedia elements such as animations, audio narration, and embedded videos. As a result, these advanced digital storybooks provide a richer and more engaging reading experience that can enhance students' comprehension, motivation, and overall participation in reading activities.

Although these classifications differ in their focus and organization, both highlight that the key feature of digital storybooks lies in the integration of multiple modes of communication, including

text, images, audio, and interactive elements, which together create a rich and multisensory reading experience. Digital storybooks can also be categorized according to their level of complexity and interactivity, ranging from simple digital versions of printed texts to sophisticated multimedia applications with extensive interactive features. This diversity enables digital storybooks to accommodate various educational purposes and learner needs. More advanced formats, in particular, offer enhanced learning experiences by combining literacy development with increased motivation, active participation, and cognitive engagement throughout the reading process.

2.1.3.3 Criteria of Good Digital Storybook

With engaging narratives and colorful visuals, digital storybooks aim to engage young readers while fostering the growth of reading abilities and cognitive meaning-making processes that help in their understanding of others, themselves, and life events (Vackova et al., 2023). According to Vackova et al. (2023) books. There are nine quality criteria to make a good Digital storybook:

a) Purposeful

Digital storybooks should have clear learning objectives. Good digital books convey specific educational value, are designed to support early literacy, and are not simply entertaining. Their design should avoid distracting elements such as advertising or excessive entertainment features.

b) Sustained

Good digital books encourage repeated engagement. This includes designs that allow children to reread the same story to reinforce comprehension, expand vocabulary, and improve retention.

c) Intercultural

Quality digital books accommodate cultural diversity. They include visual and textual representations that respect children's ethnic, linguistic, and cultural backgrounds, and avoid stereotypes. Books should allow children to discover their own identities and recognize others in the story.

d) Interactive

Interactivity is the main characteristic of digital books. A good digital book should have interactive features that help children understand the story, not distract them.

e) Child-friendly

Design should be tailored to children's abilities and needs. For example, large icons, bright colours, large fonts, simple navigation, and not relying on high reading or spelling skills.

f) Accessible

A good digital book should be accessible to children with a variety of special needs: visual, hearing, motor, or learning disabilities. Features that support accessibility include text-to-speech, subtitles, high colour contrast, variable text size, and alternative narratives.

g) Personalisable

Good books allow for personalization such as character names, photos, voice choices, and customized stories. This helps children feel connected to the story and increases motivation to read. However, personalization algorithms must be designed carefully so as not to reduce the diversity of the reading experience.

h) Creative

Quality digital books provide opportunities for children's creativity, for example by letting children create their own stories, draw, fill in stories, or play roles. Open-ended elements are highly recommended so that children can actively contribute and imagine freely.

i) Social

The social aspect of reading is essential. Digital books should support interaction between children and parents, teachers, or peers. Features such as open-ended questions, dialogic prompts, or interactive characters can enhance conversation, share stories, and support meaningful co-reading.

It can be concluded that a high-quality digital storybook should be visually engaging, interactive, and able to support children's literacy development and reading engagement. These nine criteria provide a framework for ensuring that digital storybooks are educational, inclusive, and meaningful for young readers..

2.1.3.4 The Procedure of implement Digital Storybook

Educators should follow a few essential procedures in order to implement a digital storybook successfully (Vackova et al., 2023). They

must first select interesting material that attracts to young readers and matches with their educational objectives. To make the digital storybook accessible to students, it should be created in an accessible format, such as an e-book or PDF. After the storybook is finished, instructors can offer it to the class during guided reading sessions, encouraging the kids to examine the narrative and the visuals. Encouraging conversations on the material improves vocabulary and understanding. Since repetition promotes language development, it is crucial to give kids the chance to read the narrative again. Lastly, teachers may improve their teaching strategies by using informal evaluations to determine students' comprehension and level of participation. This structured approach ensures that digital storybooks are effectively used as tools for enhancing literacy in young learners, aligning with the quality criteria outlined in the report (Vackova et al., 2023).

2.1.4 Sustainable Development Goals (SDGs)

2.1.4.1 Definitions of Sustainable Development Goals (SDGs)

In response to a wide range of social, economic, and environmental issues affecting societies worldwide, the international community has developed the Sustainable Development Goals (SDGs) as a common framework for collective action. From the perspective of Education for Sustainable Development (ESD), education is recognized as a key driver in equipping individuals with the knowledge, skills, attitudes, and values necessary to contribute to a more sustainable future

(UNESCO, 2021). Introduced by all United Nations member states in 2015, the SDGs comprise 17 interconnected goals designed to address global challenges, including poverty, social inequality, and environmental sustainability (Fukuda-parr, 2022). The framework emphasizes that sustainable development can only be achieved through the combination of informed decision-making, ethical responsibility, and active engagement in creating positive and lasting change.

2.1.4.2 Sustainable Development Goal no 2 Zero Hunger Theory

SDG-2, which focuses on Zero Hunger, aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture as part of the global Sustainable Development Goals framework. According to UNESCO (2017), education plays a vital role in helping learners understand the causes and consequences of hunger, recognize the importance of equitable access to food, and develop responsible behaviours that contribute to food security. Through Education for Sustainable Development (ESD), students are encouraged to build awareness, empathy, and a sense of responsibility toward individuals and communities affected by hunger.

In this context, education serves as an important means of fostering knowledge, values, and actions that support sustainable development. Integrating SDG-2 into educational practices enables learners to reflect on issues related to hunger and food distribution while promoting positive behaviours such as sharing food, helping others in need, and appreciating the value of food. The incorporation of SDG-2

principles into learning materials, including digital storybooks, provides meaningful opportunities for students to connect sustainability concepts with their daily experiences. As a result, learners can develop greater social awareness, responsibility, and engagement in addressing real-world challenges related to hunger and food security, in line with the objectives of the 2030 Agenda.

2.1.4.3 Sustainable Development Goals-Based Learning Material

Raising awareness of the SDG-2 among elementary school students is essential for developing a generation that is knowledgeable and involved in sustainable behaviours. According to (Stahl et al., 2023), students' understanding of the SDGs has a substantial impact on their attitudes and behaviours toward sustainability. Educational institutions play an important role in this process by including SDG-related themes in their curricula and encouraging student engagement in initiatives that promote sustainability. According to research, when students learn about the SDGs, they are more likely to participate in community service and environmental conservation (Filho et al., 2024). This involvement not only increases their awareness of global concerns, but also enables students to take action in their areas. Schools can increase awareness through a variety of strategies, including engagement with local conservation organizations through digital storybooks.

2.2 Empirical Review

Digital storybooks have gained recognition as effective tools for fostering reading engagement and comprehension. Yang & Daimin (2023) showed that features such as interactivity, meaningful content, and colorful illustrations significantly increased elementary students' interest and comprehension. Similarly, Son & Butcher (2024)) found that animations aligned with the storyline enhanced preschoolers' enjoyment and understanding more effectively than static or irrelevant visuals. At the same time, Pratiwi et al. (2022) observed that while many storybooks were physically well-prepared, they often lacked locally relevant content, reducing their effectiveness for teachers and learners. Taken together, these findings highlight that successful digital storybooks should combine interactivity, visual appeal, and contextual relevance. However, they largely overlook thematic integration with global issues, such as the Sustainable Development Goals (SDGs), which is the primary concern of this study.

Several previous studies have demonstrated the effectiveness of storybooks in improving various aspects of elementary school students' competencies, both in print and digital formats. Darmawan & Wuryandani (2022) demonstrated that the use of illustrated storybooks significantly improves creative thinking skills and student learning outcomes through a more innovative and interactive approach. Similarly, Mynaryathy & Wijayanti (2023) emphasized the urgency of developing Android-based digital storybooks, through their needs analysis, to address the crisis of student character and learning independence, as well as to address teachers'

limitations in providing learning media aligned with the Independent Curriculum. Furthermore, Shabiriani et al. (2023) reinforced these findings by applying the Design Thinking method to design the digital book "Garudeya," which proved effective in increasing reading interest and understanding of local moral and cultural values through a playful design concept. Collectively, these findings confirm that the integration of visual appeal, digital technology, and value content is key to creating effective literacy media for elementary school students.

Beyond general literacy outcomes, digital storybooks have also been applied within Task-Based Language Teaching (TBLT) frameworks to strengthen specific language skills. Mahadewi et al. (2024) reported that TBLT-based storybooks improved speaking skills among eighth graders, while Setiawati et al. (2024) found similar success in enhancing ninth graders' reading abilities. Supporting this, Maharani et al. (2023) confirmed that combining TBLT with digital storybooks improved both reading performance and student engagement. These findings demonstrate that embedding structured pedagogical strategies in storybooks can significantly support language learning. Nevertheless, most of this research centers on language proficiency, whereas the current study focuses on reading behavioural engagement as its primary outcome.

In addition to language development, several studies have used digital storybooks to integrate moral, cultural, and character education. (Yasmin, 2024), for instance, created a Canva-based storybook that promoted respect for parents and teachers, receiving positive responses from both educators and

students. Similarly, Maharani et al. (2023) developed storybooks aligned with the Pancasila Student Profile, while Shabiriani et al. (2023) introduced historical heritage through the digital storybook Garudeya. These works demonstrate the potential of storybooks to combine literacy goals with value-based learning. However, Study from Sastra & Wibawa (2025) revealed that while fifth-grade students recognize the importance of reading materials centered on SDGs themes like health and environmental protection. Despite this progress, there is still limited exploration of how storybooks can incorporate global awareness themes, particularly SDG-2-Zero Hunger, into reading activities for elementary learners.

Research on SDG-2 underlines its urgency and relevance. Yusof et al. (2023) identified climate change, inequality, and weak policies as major challenges affecting food security, while Mulero et al. (2024) noted that young people are generally aware of SDG-2 issues and willing to participate in initiatives such as campaigns and food drives. Izzo et al. (2020) further revealed that while companies acknowledge SDG-2, reporting practices remain inconsistent and superficial. These studies emphasize the broader societal importance of SDG-2 but do not address its pedagogical application, particularly its potential to improve reading behavioural engagement among elementary students. This research seeks to bridge that gap by developing an SDG-2-based digital storybook tailored to the needs of Grade 5 students at SD Mutiara.

Based on the empirical study, especially when it comes to English language learning, there is a noticeable lack of integration previous of the

Sustainable Development Goals (SDGs) into digital storybooks created especially for elementary school in the present landscape of educational resources. Although other research has examined how well digital storybooks can enhance reading behavioural engagement, there is still a lack have specific focus on SDG-2: Zero Hunger as a topic theme in an English reading framework. This offers an opportunity to create digital storybooks that answer important global concerns especially SDG-2 Zero Hunger while fulfilling the educational requirements of young readers.

2.3 Conceptual Framework

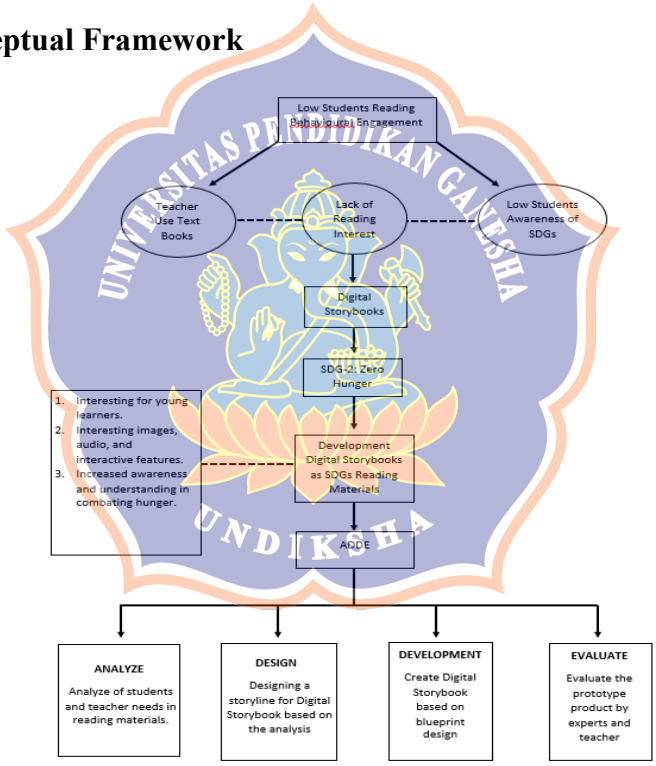


Figure 1. Conceptual Framework

Figure 1. Shows the conceptual framework for this study. Researcher found that students' reading behavioural engagement is low, along with the material still use in textbooks and the limited of appropriate books that are available, which makes the students less interested in reading. Instead of reading, students often see playing around with their friends as a distracted

behavioural to other students. Because of that, the digital storybook proposed to address the reading behavioural engagement among fifth-grade students in elementary school. There are some advantages of digital storybook that not only contain text only but also display images, audio and interactive features that attracted students' interest in reading, and previous study shows that by using digital storybook can enhance students' reading behavioural engagement among young learners. Developing a digital storybook on the topic of SDGs can provide students with knowledge of global challenges that they may encounter in their daily lives. Especially in SDG-2 Zero Hunger by combating hunger and sharing food. The development of digital storybook as SDGs reading media using the ADDE model from the Analyze, Design, Development, and Evaluation stage. The digital Storybook product hoped can be support students' reading behavioural engagement and build students' awareness of the importance of SDGs for their daily lives and future.

CHAPTER III

RESEARCH METHOD

3.1 Research Design

This study uses the Design and Development (D&D) research method based on the ADDE model by Richey & Klein (2014). The model includes Analysis, Design, Development, and Evaluation, without the implementation stage. According to Richey & Klein (2014), the essential phases in Design and Development research are Analysis, Design, Development, and Evaluation (ADDE). The Implementation stage is not included because it focuses on the adoption and use of the product in real situations, which goes beyond the main goal of design and development research. Besides that, this due to time constraints and cost effectiveness. Therefore, the Research and Development process in this study follows these four key stages.

Figure 2. Research Design Flow

Figure 2 shows the research design framework that explains the research steps conducted in this study. The following is a further explanation of the figure:

A. Analysis

This process involves seeking for analysis towards the current reading behavioural engagement levels among fifth-grade students at SD Mutiara Singaraja, This stage include observing students learning process and teacher interview to identify the needs of students and teacher regarding the reading media.

B. Design

Based on need analysis, this phase is the process of creating a storyline for a digital storybook. This phase includes defining story structure, character and plot.

C. Development

This phase conducts development of prototype product of digital storybook, incorporating the design elements from the previous stage. This prototype product develop using Paint Tool SAI application and interactive online product using Netlify.

D. Evaluation

This is the process of evaluating digital storybook products, inviting expertise and teacher to give their insight about the product developed using expert judgement checklist.

3.2 Research Setting

The research was conducted at SD Mutiara Elementary School in Singaraja, Bali. This school was selected because the fifth-grade English teacher holds a degree in English Language Education (ELE), indicating

adequate pedagogical competence in teaching English and implementing digital learning materials. Preliminary observations revealed a limited availability of digital reading materials that integrate global issues, particularly the Sustainable Development Goals (SDGs). In addition, the teacher demonstrated limited familiarity with SDG-related content, especially SDG-2 (Zero Hunger). These conditions highlighted the need for the development of a digital storybook incorporating SDG-2 concepts to support students' literacy development and facilitate their reading behavioural engagement.

3.3 Research Subject and Object

The subject of this research focused on fifth-grade students and a teacher at SD Mutiara Singaraja, which was selected to address a gap in previous studies that have not extensively explored the development of SDG-based reading media for young learners, particularly those aimed at fostering reading behavioural engagement. Moreover, the reading media mainly used in the school were textbooks and did not introduce global themes such as the Sustainable Development Goals (SDGs) into classroom learning. The object of this study focused on a digital storybook designed as an interactive reading resource integrating the SDG-2: Zero Hunger theme. To evaluate its implementation and usability, the developed digital storybook was conducted through one trial session involving the fifth-grade students and teacher at SD Mutiara Singaraja.

3.4 Definitions and Operational of Key Terms

a. Digital Storybook

According to Vackova et al. (2023), digital storybooks are digital adaptations of traditional children's books that are delivered through interactive digital platforms. They are commonly utilized in educational contexts to promote literacy development and enhance student engagement in reading activities. In this study, a digital storybook is defined as a story-based reading resource developed by the researcher using digital technology. The storybook is specifically designed for fifth-grade students and incorporates narrative text, visual illustrations, and audio narration to support reading behavioural engagement throughout the reading process.

b. Reading Behavioural Engagement

Reading behavioural engagement refers to children's observable involvement in reading activities, including their attention, participation, and persistence while reading. According to (McGeown & Smith, 2024), reading behavioural engagement consists of two dimensions: active engagement and interactive engagement. Active engagement is shown through non-verbal behaviours, such as paying attention and showing interest in the reading material. Interactive engagement involves verbal participation, such as asking questions, answering questions, and commenting on the story. In this study, reading behavioural engagement was not measured directly through students' reading activities. Instead, expert judgment and teacher validation were used to evaluate whether the

features of the developed digital storybook have the potential to promote reading behavioural engagement.

c. SDGs

The United Nations created the set of 17 Sustainable Development Goals (SDGs) in order to solve global issues including poverty, inequality, environmental degradation, climate change, peace, and justice by the year 2030 (UNESCO, 2017). According to this study, the SDGs provide the reading media's topic foundation and are particularly used for incorporating sustainability and global consciousness principles into young learners.

d. Sustainable Development Goal 2

SDG-2 refers to ensuring Zero Hunger patterns. It emphasizes raising awareness against hunger and promote sustainable agriculture through Education for Sustainable Development (ESD) (UNESCO, 2017). SDG-2 in this study is operationalized through the content of the digital storybook, which tells a story related to prevent hunger, food sharing, help others who are hungry. It designed to be understandable and familiar to elementary school students.

e. Teaching English for Young Learners

Teaching English for Young Learners (TEYL) refers to the practice of introducing English to children at the early stages of education, such as preschool and elementary school, whose first language is not English (Islahuddin, 2023). In this study, the developed digital storybook is presented in English and incorporates SDG-2 Zero Hunger themes. The storybook serves as a learning medium that supports students' reading

development, vocabulary learning, and engagement with the English language.

3.5 Data Collection Method and Instruments

The data collection in this study is conducted through qualitative and quantitative methods. The techniques and instruments used are:

a) Observation Sheet of Reading Behavioural Engagement Instrument

The observation sheet (Table 1) is designed to obtain an overview of the school and classroom reading environment at SD Mutiara Singaraja. The purpose is to identify the sources of reading materials available and how the students reading behavioural engagement at SD Mutiara Singaraja. The instrument use is an observation sheet developed based from Hutchinson & Waters (1987) Needs Analysis framework which consists of two main components. The first is Target Needs, which describe what learners must achieve in the target situation, including their necessities, lacks, and wants. The second is Learning Needs, which explain how learners learn most effectively, such as their motivation, strategies, and preferences. Table 1 observation sheet used to obtain an overview of the situation occurring in the school environment and classroom.

Table 1. Blueprint instrument observation sheet

Category	Aspect	Items	No Items
Target Needs	Necessities	- Availability of reading materials and exercises related to Zero Hunger (SDG-2). - Need for guidance to stay focused while reading. - Need for clear explanations of unfamiliar terms related to SDG-2 to improve understanding.	1-5

		- Students need story texts that are appropriately short and manageable to maintain focus and prevent cognitive overload. - Students need reading content that matches their cognitive level and background knowledge.	
	Lacks	- Students need to understand key concepts of Zero Hunger (SDG-2) through age-appropriate texts. - Students need reading tasks that help develop comprehension skills related to real-world applications of Zero Hunger. - Students need opportunities to connect SDG-2 content with their daily lives to build relevance and motivation. - Students need exposure to stories that include concepts related to Zero Hunger (SDG-2). - Students need themes that connect real-life situations with Zero Hunger to build relevance and motivation.	6-10
	Wants	- Students prefer stories with interesting or creative themes (Zero Hunger). - Students prefer reading media that include colorful or visually appealing illustrations. - Students prefer characters that match their age group or personalities they can relate to. - Students prefer reading topics connected to real-life issues. - Students prefer reading activities that feel enjoyable or motivating.	11-15
Learning Needs		- Students need relatable and age-appropriate characters to support engagement and comprehension. - Students need guided questions or prompt during reading to help them interpret the story. - Students need visual or interactive elements to maintain motivation and support understanding. - Students need opportunities to choose reading styles such as individual, pair, or group.	16-19

Table 1 shows there are 19 items of observation sheet developed based on Hutchinson & Waters, (1987). The items indicate that students require clear vocabulary support, relatable themes about fairness, and visually appealing stories to stay motivated. Overall, the table highlights the need to align reading content with students' cognitive levels and interests.

b) Interview Sheet of Reading Behavioural Engagement Instrument

Interviews were employed as a data collection method to capture opinions, experiences, and insights relevant to the study. In this research, interviews with teachers were conducted to better understand student reading engagement, including their participation, motivation, and the challenges they face. The instrument used was an interview guide designed using Hutchinson and Waters (1987) Needs Analysis framework, which includes target needs and learning needs. This framework helped to ensure that the interview questions supported the alignment of the SDG-2 based digital storybook with teacher needs regarding the reading media.

Table 2. Blueprint instrument interview guide

Category	Aspects	Items	No items
Target Needs	Necessities	- Teacher understanding of the concept of Sustainable Development Goals (SDGs). - Teacher knowledge about SDG-2, which topic do you think grade fifth students can understand the easiest? - Teacher opinion about which SDG-2 topic is most relevant for grade fifth students' daily life - Teacher opinion about which SDG-2 topic should be introduced first to grade fifth students and why?	20-23
	Lacks	- Teacher understanding of their role in using the SDG-2 digital storybook - Teacher identification of possible challenges in using the digital storybook - Teacher suggestion the best strategies to implement the digital storybook	24-26
	Wants	- Teacher preference for the most suitable SDG-2 topics to integrate into English reading lessons. - Teacher expectations of support needed to teach SDG-2. - Teacher preferred teaching activities to integrate SDG-2.	27-29
Learning Needs	Learning Preferences	- Teacher observation on students' preferred learning styles when reading stories such as visual, auditory, or multimodal. - Teacher perception of which reading activities help students understand stories better such as	30-34

Category	Aspects	Items	No items
		shared reading, group reading, or independent reading. - Teacher views on students' responses toward interactive learning activities such as storytelling, role-play, or guided discussions. - Students need guided reading tasks to help identify cause effect, main ideas, and supporting details related to SDG-2. - Students need teacher guidance to clarify unfamiliar specific terms or complex ideas about combating hunger.	
	Classroom Learning Conditions	- Teacher explanation of classroom conditions that make students more engaged and focused when reading such as fun atmosphere, small groups, or structured guidance. - Teacher opinion on whether students understand texts better through group work or individual tasks. - Teacher identification of factors that support or hinder students' reading comprehension during class activities.	35-37
	Required Teacher Support	- Teacher views on the types of support students' need, such as vocabulary explanations, reading modeling, or simplified meaning. - Teacher opinion on whether students benefit from supplementary aids like pictures, glossaries, or pre-reading summaries. - Teacher explanation of the kinds of feedback that help students understand characters, story sequences, and the message of the text.	38-40
	Material Requirements	- Teacher preference regarding the appropriate story length for grade fifth students such as number of paragraphs or complexity level. - Teacher views on the types of characters that are easiest for students to understand such as children, animals, family members. - Teacher explanation of the kinds of story content suitable for students such as simple narratives, sequential events, texts with visual support. - Teacher opinion on whether the story can incorporate SDG content especially SDG-2 (Zero Hunger) and how well students can understand in combating hunger. - Teacher suggestion on the themes most relevant and engaging for grade fifth students, like food.	41-45

Table 2 shows there are 25 items of interview guide developed based on Hutchinson and Waters (1987) and UNESCO (2017). The interview focuses on learning needs, including students' learning preferences, classroom conditions, required teacher support, and material suitability. Overall, the blueprint ensures that each interview item is aligned with the goal of understanding how teachers can effectively support Grade fifth students' engagement when reading SDG-2 themed stories.

c) **Expert Checklist Instrument**

Expert judgement was used as a method to collect validation data regarding the quality and relevance of the developed digital storybook. In this study, two types of validators were involved: expert validator and teacher. The expert validator evaluated the digital based on the digital storybook criteria adapted from Vackova et al. (2023) and the alignment of the story content with SDG-2 learning objectives adapted from UNESCO (2017). Meanwhile, teacher assessed the extent to which the storybook supported indicators of reading behavioural engagement adapted from (Fredricks et al., 2004; Guthrie, 2004; McGeown & Smith, 2024).

Table 3. Blueprint instrument criteria of digital storybook

Category	Aspects	Items	No Item
Quality of Digital Storybook	Purposeful	- The Digital Storybook has a clear learning goal and supports school-related learning content. - Multimedia such as images, sound, animation is chosen to strengthen the content of the story. - The information is presented concisely, not long, and does not require technical knowledge.	1-3

Category	Aspects	Items	No Item
	Sustained	- The story and features of this digital storybook keep the children engaged in reading until the end. - Stories use cliffhangers, light conflicts, or curiosity that encourage children to continue reading. - Digital content provides small variations that encourage curiosity every time it is opened.	4-6
	Intercultural	- The language, names, or expressions in the story reflect the cultural realities depicted. - No character is depicted as inferior/superior based on cultural background. - The story shows that cross-cultural cooperation strengthens shared values.	7-9
	Interactive	- There are no excessive visual or audio elements to confuse the child. - Interaction helps children follow the story's progress gradually. - Activating features provides additional information that deepens understanding.	10-12
	Child friendly	- Use of simple and clear language appropriate for children's reading level - The amount of text per page is age-appropriate, and the narrative language is simple and child-friendly. - The visual elements are not too crowded and there is no distracting music or sound.	13-15
	Accessible	- Availability of features that support children in reading like audio - Presence of simple explanations for difficult words - Use of visual or animated aids that help children understand the story	16-18
	Personalizable	- Opportunities for children to give a simple personal response at the end of the story - Availability of options for children to choose preferred characters - Opportunities for children to select their favourite part of the story	19-21
	Creative	- Use of imaginative visuals that attract children attention for example, unique characters or settings - Presence of sound effects or music that match the events in the story - Use of animation effects such as movement or transitions that enhance engagement and interest	22-24
	Social	- Presence of character interactions that model positive social behavioural like helping, sharing or cooperating	25-27

Category	Aspects	Items	No Item
		- Inclusion of scenarios that illustrate social values such as empathy, respect, or kindness - Opportunities for characters to work together to solve problems, promoting teamwork	

Table 3 shows there are 27 items of Criteria of Digital Storybook developed based Vackova et al. (2023)). The quality checklist evaluates nine key aspects of the digital storybook, including purposefulness, sustained engagement, intercultural elements, interactivity, and child-friendliness. The items highlight essential features that ensure the storybook is accessible, creative, and supportive of children's reading development. Overall, the table outlines the criteria used to assess whether the digital storybook is pedagogically appropriate and engaging for Grade fifth learners.

Table 4. Blueprint instrument reading behavioural engagement

Category	Aspect	Items	No Item
Reading Behavioural Engagement	Effort	- The Digital Storybook shows students' reading effort. - The Digital Storybook encourages students to try harder. - The Digital Storybook supports students in re-reading difficult parts.	1-3
	Persistence	- The Digital Storybook helps students finish the story. - The Digital Storybook keeps students reading through challenges. - The Digital Storybook promotes consistent reading until completion.	4-6
	Attention	- The Digital Storybook maintains students' attention. - The Digital Storybook helps students stay focused. - The Digital Storybook reduces distraction during reading.	7-9
	Positive Conduct	- The Digital Storybook encourages positive reading behavioural. - The Digital Storybook supports orderly reading routines.	10-12

Category	Aspect	Items	No Item
		- The Digital Storybook promotes responsible digital use.	
	Active Participation	- The Digital Storybook encourages student participation. - The Digital Storybook stimulates sharing during reading. - The Digital Storybook shows involvement in reading activities.	13-15
	Reading Frequency	- The Digital Storybook shows reading frequency. - The Digital Storybook motivates students to read more. - The Digital Storybook encourages regular reading habits.	16-18
	Interaction with Texts	- The Digital Storybook encourages deeper story exploration. - The Digital Storybook promotes connections with the story. - The Digital Storybook motivates reading of similar texts.	19-21

Table 4 shows there are 21 items of reading behavioural engagement developed based on Fredricks et al. (2004), Guthrie, (2004), and McGeown and Smith (2024). The indicators of reading behavioural engagement include effort, persistence, attention, positive conduct, active participation, reading frequency, and interaction with texts. The items illustrate how the digital storybook is expected to support sustained focus, responsible reading behavior, and greater involvement in reading activities. Overall, the table outlines the behavioural engagement dimensions used to evaluate students' responses while reading the digital storybook

Table 5. SDG-2 blueprint instrument

Category	Aspect	Indicators Specific	No Item
SDG-2 Zero Hunger based material through Digital Storybook	Behavior in Food Sharing (socio-cultural functions of food)	- The storybook explains how unequal access to food can cause hunger such as different food security caused by poverty and climate change.	94 – 98

Category	Aspect	Indicators Specific	No Item
		- The storybook illustrates how students can share food through simple, real life actions such as share snack, give food, and split meal. - The storybook demonstrates how individual and collective responsibility play an important role in combating hunger by helping others who are hungry, such as offering food to others. - The storybook encourages students to critically reflect on their behavior toward sharing food with others. - The storybook promotes a culture of caring and sharing by showing kindness rather than ignore or reject others in need	

Table 5. shows there are 5 items of SDG-2 Zero Hunger developed based on UNESCO (2017)

Based on all the instrument blueprint above, content validity was measured using the Content Validity Rating Form Proposed by (Gregory, 2015). The validators were asked to assess the relevance of each item in the evaluation instrument. The results from the expert judgement were used to revise and improve the clarity, relevance and overall quality of the digital storybook. Content validity refers to how appropriate and relevant each item to the purpose of the study. To measure this, a cross-tabulation table from (Gregory, 2015) which include 4-point rating scale. The ratings were grouped into two categories, such as: weak relevance was rated from 1 to 2, while strong relevance was rated from 3 to 4. The result is placed into 2X2 table to identify items that both validators agreed were strongly relevant. The content validity coefficient was calculated by dividing the number of

strong agreements by the total number of items. This process helps determine suitable items, while expert judgement remains important to ensure completeness.

Table 6 is table of Gregory Content Validity Rating Form used to assess the relevance and clarity of the research instrument.

Table 6 The Gregory content validity rating form

Score	Description
1	Not Relevant
2	Somewhat Relevant
3	Quite relevant
4	Very Relevant

Table 6 presents the scoring system adapted from Rijal et al. (2023) that was used by expert judgement to evaluate the relevance of each question item. The scale ranges from 1 for not relevant, 2 for somewhat relevant, 3 for quite relevant, to 4 for very relevant. This scoring system helps to ensure that each item is valid and accurately measures the intended content.

Table 7 The Gregory cross tabulation

Tabulation Results		Expert 1	
		Weak relevance (item rated 1or 2)	Strong relevance (3 or 4)
Expert 2	Weak relevance (item rated 1 or 2)	A	B
	Strong relevance (item rated 3 or 4)	C	D

The formula:

$$V = \frac{D}{A + B + C + D}$$

Explanation:

V : Validity

A : Both experts disagree

B : The first expert agrees, but the second expert disagrees

C : The first expert disagrees, but the second expert agrees

D : Both experts agree

Table 7 presents the cross-tabulation method proposed by Rijal et al. (2023) to calculate content validity. It compares the ratings from two experts by grouping them into weak relevance with scores ranging from 1 to 2 and in terms of strong relevance, the scores ranged from 3 to 4. The content validity value (V) is calculated using the formula V= D/ (A+B+C+D), where D represents the number of items that both experts agree are strongly relevant. This table was used to identify the level of agreement between experts and to determine the overall validity of the digital storybook instrument.

Table 8 The Gregory test validity criteria

Number	Values intervals	Criteria
1	0,8- 1	Very high
2	0,6- 0,79	High
3	0,40- 0,59	Medium
4	0,20- 0,39	Low
5	0,00- 0,19	Very low

Table 8 shows the interpretation of the validity score based on Rijal et al. (2023). It classifies the validity coefficient (V) into five levels, ranging from very low to very high, according to specific value intervals this

interpretation helps the researcher determine the level of instrument validity and whether it meets acceptable standards for educational instruments.

Table 9 Content validity result of observation sheet

Tabulation Result		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A= 0	B= 0
	Relevant	C= 0	D= 19

$$V = \frac{D}{A + B + C + D}$$

$$V = \frac{19}{0 + 0 + 0 + 19}$$

$$V = \frac{19}{19} = 1.00$$

From the 19 items assessed in the observation sheet, there were no items categorized in A, B or C. All 19 items were categorized in D, meaning that both experts agreed that all items were relevant and aligned with framework. Based on the calculation using Gregory formula, the V value was 1.00. which were further categorized to the interpretation of the validity score based on Rijal et al. (2023) and this value was categorized as Very High Validity. Therefore, the observation sheet instrument has fulfilled the criteria of content validity and all items are appropriately representing the aspects.

Table 10 Content validity result interview guide

Tabulation Result	Expert 1

		Irrelevant	Relevant
Expert 2	Irrelevant	A= 0	B= 0
	Relevant	C= 0	D= 26

$$V = \frac{D}{A + B + C + D}$$

$$V = \frac{26}{0 + 0 + 0 + 26}$$

$$V = \frac{26}{26} = 1.00$$

From the 26 items evaluated in the interview guide instrument, there were no items included in categories A, B, or C. all 26 items were categorized in D, which means both experts agreed that all interview items were relevant and meet the framework by Hutchinson and Waters (1987). Based on the Gregory formula calculation, the V value obtained 1.00, according to the interpretation of the validity score based on Rijal et al. (2023) this value falls into the very high category. Thus, it can be concluded that the interview guide instrument meets the requirements of content validity.

Table 11 Content validity result criteria of digital storybook

Tabulation Result		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A= 0	B= 0
	Relevant	C= 0	D= 27

$$V = \frac{D}{A + B + C + D}$$

$$V = \frac{27}{0 + 0 + 0 + 27}$$

$$V = \frac{27}{27} = 1.00$$

Out of the 27 items assessed in the digital storybook criteria instrument, all items were categorized under category D. None of the items fell into categories A, B, or C, which shows that both experts consistently agreed on the relevance of each item and confirmed that they were aligned with Vackova et al. (2023) theoretical framework. The calculation using Gregory Formula produced a V value of 1.00, based on the validity interpretation proposed by Rijal et al. (2023) this score is classified as a very high quality. Therefore, these instruments demonstrate strong content validity and is suitable for implementation.

Table 12 Content validity result of reading behavioural engagement

Tabulation Result		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A= 0	B= 0
	Relevant	C= 0	D= 21

$$V = \frac{D}{A + B + C + D}$$

$$V = \frac{21}{0 + 0 + 0 + 21}$$

$$V = \frac{21}{21} = 1.00$$

Among the 21 items assessed in terms of reading behavioural engagement instrument, none were classified into categories A, B, or C. All items were placed in category D. indicating agreement between two experts and consistency with theoretical perspective on reading behavioural engagement proposed by Fredricks et al., (2004), Guthrie (2004), McGeown and & Smith, (2024). The calculation using Gregory formula indicating the V value of 1.00, so this indicates very high content validity based on criteria. Therefore, it can be concluded that reading behavioural engagement instrument meet the requirement of content validity and it appropriate for use.

Table 13 Content validity result of SDG-2 learning objectives

Tabulation Result		Expert 1	
		Irrelevant	Relevant
Expert 2	Irrelevant	A= 0	B= 0
	Relevant	C= 0	D= 5

$$V = \frac{D}{A + B + C + D}$$

$$V = \frac{5}{0 + 0 + 0 + 5}$$

$$V = \frac{5}{5} = 1.00$$

All 5 items in the SDG-2 Learning Objectives instrument were evaluated by two experts, the analysis showed that none of the items fell into categories A, B, or C. instead, all five items were classified under category D, indicating full agreement between both experts and content alignment on UNESCO (2017) . The calculation using Gregory formula resulted in a validity coefficient (V) of 1.00. according to Rijal et al. (2023) interpretation validity score, this score falls within the Very High Validity range. This suggest that SDG-2 Learning objectives instrument demonstrated level of content validity.

3.6 Data Analysis Methods and Techniques

Data analysis in this study was conducted using quantitative and qualitative approaches to provide a comprehensive data of digital storybook as SDGs-based teaching materials.

a. Qualitative Method

Qualitative methods analyzed using the Descriptive qualitative data analysis proposed by Miles et al, (2014). This model views analysis as an ongoing process that occurs simultaneously with data collection, consisting of three concurrent flows of activity such as: 1) Data condensation, 2) Data Display 3). Conclusion drawing and verification. These components allowing the researcher to build credible and well structure findings.

1) Data condensation

Data condensation involves selecting, simplifying, and organizing the collected information to make it clearer and more meaningful. At this phase, the researcher focused on the essential data obtained from observation, interview, and expert validation. The process aimed to highlight the most relevant information that directly supports the objectives of developing the digital storybook.

2) Data Display

Data display refers to presenting organized information in a clear and structured way through tables. This step helps the researcher identify patterns, relationships and trends withing the data. In this study, the researcher used tables and charts to display the results of data analysis making it easier to interpret the findings clearly and systematically.

3) Drawing and Verifying conclusion

This final stage focuses on interpreting the organized data and confirming the accuracy of the conclusions. The researcher reviews the emerging patterns and relationship to formulate reliable interpretations.

Verification is done by rechecking the data to ensure that the conclusion is well supported and consistent with the overall findings

b. Quantitative Method

The quantitative method was used to analyze the data from product evaluation conducted by experts and teachers to assess the quality of the product. The data were analyzed using descriptive statistics. The analysis included the calculation of the mean score, standard deviation, minimum and maximum score to determine the overall quality of the developed product. Furthermore, the ideal mean (Mi) and ideal standard deviation (Sdi) were calculated to classify the product qualification level.

The product qualification criteria are adapted from Nurkancana (1992), which classifies the product into several categories, namely: excellent, good, average, below average, and poor. The product qualification criteria are presented in table 14.

Table 14 Qualification criteria for product

Value interval	**General criteria**
$X \geq Mi + 1.5Sdi$	Excellent
$Mi + 0.5Sdi \leq X < Mi + 1.5Sdi$	Good
$Mi - 0.5Sdi \leq X < Mi + 0.5Sdi$	Average
$Mi - 1.5Sdi \leq X < Mi - 0.5Sdi$	Below average
$X < Mi - 1.5Sdi$	Poor

Information:

X = The value obtained by the teacher

Mi = Ideal score obtained from 1 / 2 (maximum + minimum score)

Sdi = Standard deviation obtained from 1 / 3 (Mi)

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter provided the findings, discussions, and potential implications regarding the development of a digital storybook as enrichment materials, tailored to the Emancipated Learning curriculum for grade fifth students at SD Mutiara Singaraja. This research synthesized the information gathered from the research instruments and connected these insights with existing theories, building a bridge between the findings and the theoretical framework. This chapter aimed to illustrate the implications and significance of creating this e-storybook in an English educational context, aligning it with the theoretical foundations to strengthen its relevance and effectiveness.

4.1 Findings

This section presents the findings of the study obtained from several data sources, including classroom observations, teacher interviews, peer reviews, and expert assessments. These data were used to answer the research questions related to the development of a digital storybook integrated with SDG-2 to facilitate fifth-grade students' reading engagement at SD Mutiara Singaraja. This study applied the Design and Development (D&D) model proposed by Richey & Klein (2014), which consists of four phases: analysis, design, development, and evaluation. These phases guided the systematic process of developing the digital storybook.

In the analysis phase, classroom observations and teacher interviews were conducted to identify students' and teachers' needs regarding reading

media. The findings informed the design phase, in which the storybook content, narrative structure, and interactive features were planned and refined through peer review. During the development phase, the design was transformed into a functional digital storybook and revised based on feedback. Finally, in the evaluation phase, experts assessed the quality and appropriateness of the product to ensure its effectiveness in supporting students' reading behavioural engagement.

4.1.1 The Needs of Fifth Grade Students and Teachers Regarding Reading Media that Integrate SDG-2 to Facilitate Reading Behavioural Engagement

The findings indicate that both students and teachers need reading media that effectively incorporate SDG-2 (Zero Hunger) while promoting students' reading behavioural engagement. The results showed that students possessed only a basic understanding of SDG-2 concepts and were generally unfamiliar with issues beyond simple environmental practices. Many students experienced difficulty comprehending texts independently and frequently depended on teacher assistance to understand the content. In addition, their independent reading skills were relatively limited, and they often struggled to relate the information presented in stories to real-life situations.

To overcome these challenges, students expressed a preference for reading media that are easy to understand, appropriate for their age level, visually appealing, and relevant to their everyday experiences. They also favored stories featuring relatable characters and interactive components, such as games and guiding questions, which help maintain their attention and encourage active participation. Furthermore, learning activities that combine

individual and group-based tasks were identified as effective in fostering greater engagement during reading sessions.

From the teachers' perspective, insufficient knowledge of SDG-2 and the limited availability of suitable learning resources made it difficult to design meaningful instructional activities. Consequently, teachers required instructional materials that present sustainability concepts in a clear, contextualized, and practical manner that is accessible to elementary school students. Overall, the findings suggest that the use of interactive, story-based reading media integrated with SDG-2 is crucial for encouraging students' active participation and enhancing their engagement in reading activities. To provide a clearer overview of the findings obtained from the observation and interview data, the condensed result is presented in table 15.

Table 15 Condensation table

Condensed Findings		
Category	Observation	Interview
Necessities	Reading media integrating SDG-2 (Zero Hunger) were still needed. Texts needed to be compact, simple, and age-appropriate to reduce cognitive overload. Teacher guidance was essential to support students' comprehension. Visual support was important in maintaining students' focus and understanding.	Teachers had limited prior exposure to SDG concepts and lacked access to relevant materials. SDG-2 content related to students' daily lives; especially environmental cleanliness was needed. Reading media needed to be easy to understand, contextual, and practical for fifth-grade students. Instructional materials were needed to help teachers explain sustainability concepts in a concrete and accessible way.
Lacks	Students had only a limited understanding of SDG-2 (Zero Hunger) beyond basic name of food. Many experienced difficulties interpreting SDG-related information independently and often required guidance to understand the content. Students also struggled to relate story	Teachers possessed limited knowledge of SDG-2, which constrained their ability to develop learning materials that effectively integrated sustainability concepts. Students' limited English reading proficiency further hindered their ability to comprehend texts independently.

Condensed Findings		
Category	Observation	Interview
	events to real-life situations and demonstrated limited awareness of how SDG-2 principles could be applied in everyday contexts.	Students exhibited low levels of independent reading and remained highly dependent on teacher assistance throughout reading activities.
Wants	Students preferred stories related to their daily lives that related in combating hunger. Visually appealing materials with illustrations and colorful designs were also important for maintaining interest. Relatable characters that reflected students' age and experiences enhanced engagement. Reading media that lacked visual elements or real-life relevance were perceived as less interesting and reduced students' engagement to read.	Reading media supporting flexible individual and group learning were needed. Story-based materials encouraged students to share ideas and collaborate. Engaging materials different from conventional textbooks were preferred.
Learning needs	The findings showed that students needed relatable characters to support understanding and engagement. Guided reading activities, such as guiding questions, were important for maintaining attention and encouraging active participation. Interactive features, including quizzes and visuals, helped improve comprehension and focus. In addition, a combination of individual and collaborative learning activities was considered beneficial. Clear instructional scaffolding was also needed to help students connect story content to real-life contexts and enhance understanding.	The findings also revealed that students showed greater interest in games and interactive learning activities. Lessons that relied primarily on text tended to reduce students' motivation and engagement. Therefore, learning materials should employ simple language that matches students' proficiency levels. Furthermore, story-based and game-based activities were preferred because they helped sustain students' attention and encouraged active involvement during learning activities.

4.1.1.1 The needs of grade fifth students regarding materials that integrate SDG-2 to facilitate reading behavioural engagement

The findings from the needs analysis revealed several important issues related to students' reading needs. First, there was a lack of English reading media and exercises that incorporated SDG-2 (Zero Hunger) concepts (see Figure 3). In addition, the teacher primarily relied on worksheet books as the main instructional resource for teaching reading.

Figure 3. Availability of storybook

These findings indicate a significant gap in the availability of relevant and meaningful reading media that integrate sustainability topics. The need for such materials was further confirmed through the teacher interview, which highlighted the limited access to English reading resources related to SDG-2.

Excerpt 1 (Students)
"Ya kita cuma pakai LKS aja kak"

(Yes, we usually only use worksheet book)

Excerpt 2 (Teacher)
"Ya biasanya saya memang menggunakan LKS sebagai bahan untuk mengajar"

(Yes, I usually use worksheets book as teaching material)

Furthermore, students need adequate support to sustain their attention during reading activities. Visual elements, including illustrations and attractive color schemes, were identified as important features that help maintain students' interest and concentration. Students benefit from explicit explanations of unfamiliar vocabulary and complex terms, which facilitate better comprehension of the text. Additionally, the length of the reading media should be carefully adjusted to students' cognitive capacity to avoid excessive mental demands and maintain engagement throughout the activity. These

findings were further supported by the teacher interview, which emphasized the importance of providing visually appealing and comprehensible reading media for elementary school students.

Excerpt 3 (Teacher)

"Biasanya saya bacakan hati-hati dengan bahasa Inggris, lalu saya translate lagi bahasa Indonesia"

(Usually, I read it carefully in English, then I translate it back into Indonesian.)

Therefore, reading media should be concise and written in language that is clear and easily understood by students. Overall, the reading resources currently used in schools remain insufficient, especially in incorporating meaningful topics such as SDG-2 (Zero Hunger). Students require continuous teacher support throughout the reading process to help them stay engaged and comprehend the content effectively. Such support includes the use of visual representations, explanations of unfamiliar vocabulary, and appropriate instructional scaffolding to reduce cognitive burden. These indicate that existing reading media alone are not adequate to meet students' learning needs and should be complemented by effective teacher guidance.

The findings related to the lacks category also highlight several shortcomings in students' understanding and implementation of SDG-2 concepts. While some students possessed basic prior knowledge about food and beverages, many demonstrated only a limited awareness of the broader issues and objectives associated with SDG-2. This finding was further supported by information obtained from the teacher interview.

Excerpt 4 (Teacher)

"Yang berkaitan dengan materi siswa itu mungkin tentang makanan dan minuman di kelas V"

(Related to student material, it might be about food and drink in class V

In addition, students demonstrate limited ability to interpret SDG-related information presented in reading texts. The findings reveal that many students experience difficulties in linking story events and messages to real-world situations, reducing their understanding of the practical relevance of SDG-2 in daily life. The results also indicate that students have not yet fully developed the ability to apply SDG-2 concepts when addressing problems or making decisions in contextual situations. Although students possess basic knowledge about food-related topics, they still need systematic guidance and contextualized learning resources to foster a more comprehensive and meaningful understanding of SDG-2 principles.

The observational data in the wants category further highlight students' preferences regarding reading media. The findings show that students are more interested in stories that reflect situations and experiences familiar to their everyday lives. Visual features, including illustrations and colorful layouts, were also identified as important elements that capture and sustain students' attention during reading activities. Additionally, students favor characters whose age and personalities are similar to their own, as this increases the reliability and appeal of the story. These preferences were further supported by information obtained from the teacher interview.

Excerpt 5 and 6 (Teacher)

"Ya lebih membahas ke warna, rasa (makanan), apalagi kalau buku ceritanya ada gambarnya itu lebih menarik, dan warnanya juga warna yang colourful banget"

"Yeah, it's more about color, taste and shape of food, especially if the story book has pictures, it's more interesting, and the colors are really colorful"

Although students initially show interest in reading activities, classroom observations indicate that their engagement tends to decrease when the

materials lack appealing visual elements or fail to relate to their everyday experiences. Many students lose motivation to continue reading when the content is perceived as uninteresting or disconnected from their personal lives. These findings highlight the importance of developing reading media that are visually engaging, relevant to students' real-world contexts, and appropriate for their developmental level in order to maintain sustained participation in reading activities.

Figure 4. Classroom condition

The findings within the Learning Needs category further reveal that students require specific forms of instructional support to improve both comprehension and engagement during reading. One important need is the inclusion of relatable characters whose age, characteristics, and experiences are similar to those of the students. Such characters help students connect more easily with the story, enhance their understanding of the content, and encourage continued engagement throughout the reading process. This finding was further supported by data obtained from the teacher interview.

Excerpt 7 (Teacher)

"Misalnya kalau saya mengajar Cinderella, pastinya harus ada dengan Cinderella. Dan tokoh-tokoh yang lain"

(For example, if I were to teach Cinderella, it would definitely have to include Cinderella. And other characters)

Moreover, the findings indicate that guided questions are essential for directing students' attention and stimulating active engagement throughout the reading process. Such questions encourage students to think critically about the content and support deeper comprehension of the text. The results also highlight the importance of incorporating visual and interactive features, as these elements help clarify concepts, reinforce understanding, and maintain students' behavioural engagement during reading activities. This finding was further supported by data obtained from the teacher interview.

Excerpt 8 (Teacher)

"Ada kan quiz juga yang terkait dengan cerita. Dengan quiz Paling efektif untuk membuat siswa lebih paham"

(Conduct quizzes related to the story. Quizzes are the most effective way to help students understand the story better)

In addition, classroom observations revealed that students favor a combination of individual and collaborative learning approaches during reading activities. Students tend to prefer reading independently at the initial stage to develop their own understanding of the text, followed by discussions with peers to share perspectives, clarify ideas, and deepen comprehension of the reading media. This preference was also confirmed through the teacher interview.

Excerpt 9 (Teacher)

"Ada siswa yang suka belajar berkelompok, ada juga siswa yang individual"

(There are students who like to study in groups, there are also students who like to study individually)

These findings indicate that effective reading media should incorporate characters and situations that are relevant to students' experiences, along with

guided reading activities that promote active involvement in the learning process. The inclusion of visual and interactive components is also important to support comprehension and maintain students' attention. Furthermore, reading media should accommodate both independent and collaborative learning opportunities, allowing students to build individual understanding before engaging in discussions with their peers. To further enhance learning, the materials should include appropriate instructional scaffolding that helps students relate the story content to real-world situations and develop a deeper understanding of the text. Collectively, these features can promote sustained engagement, foster active participation, and improve students' overall reading experience.

4.1.1.2 The needs of teacher regarding materials that integrate SDG-2 to facilitate students reading behavioural engagement

The findings related to teacher needs reveal that teachers possess limited knowledge of the Sustainable Development Goals (SDGs), particularly SDG-2 (Zero Hunger). This limitation tends to influence their preference for using familiar and tangible topics rather than broader or more abstract sustainability concepts in classroom instruction. Teachers highlighted that learning materials related to SDG-2 should emphasize themes connected to students' everyday lives, especially topics concerning food, as these are more accessible and relevant to fifth-grade students. These findings underscore the importance of developing SDG-2-integrated reading media that are contextualized, practical, and closely aligned with students' daily experiences.

Excerpt 10 and 11 (Teacher)

"Apakah Ibu mengetahui tentang Sustainable Development Goals sebelumnya? Belum. Hanya tentang makanan dan minuman. Warnanya, rasanya"

(Have you heard about the Sustainable Development Goals? No. Only about foods and drinks. The color, the taste)

The findings in the lacks category further indicate that students' limited English proficiency remains a significant obstacle in the implementation of SDG-2-based reading media. Although the school provides adequate technological facilities, including projectors, Wi-Fi access, and smartphones, many students still experience difficulties understanding English texts independently. As a result, teachers are often required to provide extensive support through translation and explanation of the reading content. This suggests that students have not yet developed sufficient independent reading skills and continue to rely heavily on teacher guidance throughout reading activities.

Excerpt 12 and 13 (Teacher)

"Kendalanya mungkin di siswa saja… siswanya mungkin yang kurang paham tentang teksnya. Harus di-translate. Dan juga Biasanya saya bacakan hati-hati dengan bahasa Inggris, lalu saya translate lagi bahasa Indonesia"

(The problem might be with the students… they might not understand the text well enough. It needs to be translated. I usually read it carefully in English, then translate it back into Indonesian)

The findings in the wants category reveal that teachers prefer SDG-2-integrated reading media that can accommodate various learning approaches. Although individual learning activities are viewed as beneficial for helping students develop their own understanding of the content, teachers also acknowledge the value of collaborative learning, especially in story-based lessons. Through group activities, students have opportunities to exchange ideas, discuss their interpretations, and assist one another in understanding the

reading media. Consequently, teachers favor reading resources that can be adapted for both independent and cooperative learning contexts.

Excerpt 14 and 15 (Teacher)

"Ada yang suka belajar berkelompok, ada yang individual. Dan Kalau Bahasa Inggris cerita itu berkelompok, supaya mereka bisa saling sharing"

(Some students prefer to study in groups, while others prefer to study individually. And in English, stories are taught in groups so they can share with each other.

The findings concerning students' learning preferences suggest that they are more motivated and actively involved in reading activities that include game-based elements and language that is easy to understand. Teachers reported that students often become disengaged when instructional materials rely heavily on lengthy textual explanations. As a result, incorporating interactive components and using language that is appropriate to students' proficiency levels are essential for sustaining their interest, promoting active participation, and enhancing their understanding of the reading content.

Excerpt 16 (Students)

"Kalau ada game nya baru aku mau belajar kak"

Excerpt 17 and 18 (Teacher)

"Kalau ngajar itu di sini harus ada gamenya. Kalau tidak siswanya cepat bosan dan juga harus menggunakan bahasa yang sederhana"

(If you're teaching here, there must be games. Otherwise, students will quickly get bored, and you also need to use simple language.)

The findings related to classroom conditions reveal that limited instructional time poses a challenge to the effective implementation of digital reading media. The relatively short duration of English lessons often restricts teachers' ability to adequately prepare and integrate media-based learning activities into classroom instruction. Nevertheless, teachers expressed confidence that students would show enthusiasm toward SDG-2 digital

storybooks, as such materials provide a novel and engaging learning experience. These findings suggest that digital reading media should be designed to be practical, time-efficient, and easily integrated into existing classroom schedules.

Excerpt 19 and 20 (Teacher)

"Bahasa Inggris itu 2 jam pelajaran… kadang tidak slima kalau mau menggunakan media. Dan Saya bisa memprediksi pasti bagus sih, karena ini media pertama kali"

(English is a 2-hour lesson… sometimes I don't have time to use media. And I can predict it will be good, because this is the first time I've used media.)

The findings regarding teacher support indicate that teachers require instructional resources equipped with multimedia features to better facilitate students' engagement and comprehension. Elements such as illustrations, audio components, educational games, and quizzes are viewed as valuable tools for capturing students' attention and reinforcing important SDG-2 concepts. In addition, these multimedia features can assist teachers in guiding students throughout the reading process and promoting a more interactive learning experience.

Excerpt 21 and 22 (Teacher)

"Kalau ada gambar, audio, permainan… lebih menarik dan Quiz juga… paling efektif untuk membuat dia lebih paham"

(If there are pictures, audio, games... it's more interesting and Quizzes too... are the most effective way to make him understand better)

The findings concerning material requirements indicate that teachers need reading resources that are concise, easy to understand, and aligned with students' cognitive development. Teachers highlighted the importance of using brief texts, simple sentence structures, and characters that are familiar, interesting, or humorous, as these features help students connect with the story

and understand the content more effectively. Such considerations are essential for minimizing cognitive demands and promoting greater engagement during reading activities.

Excerpt 23 (Students)

"Gak seneng kak kalau membaca panjang-panjang, buat yang pendek pendek aja ceritanya"

(Students don't like reading long stories, just make them short.)

Excerpt 24, 25, and 26 (Teacher)

"Mungkin nggak lebih dari sepuluh halaman, Kalimatnya mungkin satu sampai dua kalimat saja, dan Mungkin karakter yang lucu dan familiar dengan mereka"

(Maybe no more than ten pages, maybe just one or two sentences, and maybe the characters are cute and familiar to them.)

Based on the needs analysis, several important requirements for SDG-2 (Zero Hunger) integrated reading media were identified to support students' reading behavioural engagement. Both students and teachers emphasized the need for materials that are developmentally appropriate, contextually relevant, and written in language that matches students' English proficiency levels. These characteristics are expected to facilitate comprehension while reducing cognitive burden. Furthermore, the materials should incorporate appealing visual components, including illustrations and colorful layouts, as well as interactive elements such as games and guiding questions to sustain students' interest and encourage active participation throughout the reading process. The content should also reflect situations that are familiar to students' everyday experiences, particularly topics related to combating hunger and sharing food, so that SDG-2 concepts can be presented in a more meaningful, relatable, and accessible manner..

Figure 5. Interview with teacher

Furthermore, both students and teachers require reading media that provide clear instructional support and structured guidance to facilitate both independent and collaborative learning. Learning activities should accommodate flexible instructional approaches by combining individual reading tasks with group discussions, enabling students to actively participate, exchange ideas, and deepen their understanding of the content. Teachers also need practical and user-friendly instructional resources that assist them in explaining SDG-2 concepts effectively, particularly considering their limited prior knowledge of the topic. In addition, the inclusion of follow-up activities and interactive features is essential for reinforcing comprehension and maintaining students' engagement throughout the learning process. Overall, story-based and interactive reading media that integrate engaging features are considered the most suitable approach for incorporating SDG-2 content while promoting students' reading behavioural engagement effectively.

4.1.2 The Design and Development Process of a Digital storybook integrating SDG-2 to support grade fifth students reading behavioural engagement.

This section addresses research questions 2 by describing the design and development of a digital storybook integrating SDG-2 to support Grade fifth students reading behavioural engagement. In the design phase, the result was a storyline design with the theme of combating hunger under the title “The Farmer & The Rabbit”. The storyline consists of 14 pages with dominant illustration, short and simple sentences that suitable for grade fifth students, while also integrating SDG-2 learning objective. In the development phase, the final product was a digital storybook with illustration, pop up word translation, and clickable features which can be accessed through a web-based link.

4.1.2.1 The Blueprint of Digital Storybook

The digital storybook's blueprint was created as an organized manual to guarantee that SDG-2 is incorporated into the English learning resources. The narrative, "The Farmer & The Rabbit," centers on food sharing and unequal access to food as a result of climate change. Characterization, a plot synopsis, and a thorough scene-by-scene plan are the three main parts of the blueprint.

a. Characterization

1. Rabbit (Main Character): Rabbit is a character that faces climate change in his homeland. Represents an unequal access to food that can cause hunger. So he decided to leave his homeland until

he found some food to eat. He is quiet, fearful, and persistent, although he committed to taking vegetables without permission from the farmer.

2. Farmer (Supporting Character): Farmer is a character who represents kindness and responsibility in combating hunger. He grows vegetables through hard work and dedication to provide food from his garden. When he discovers that the rabbit has taken his vegetables, he chooses to understand the reason behind the action rather than become angry. He is caring, generous, and empathetic, as he shares food with the rabbit and allows him to help maintain the garden. Through his actions, he demonstrates the importance of helping others, sharing resources, and working together to address hunger.

b. Synopsis

A rabbit lived in a dry and barren land where no plants could grow, leaving him with nothing to eat. Hungry and desperate, he left his home in search of food. Meanwhile in the other land, a farmer was carefully growing vegetables in his garden by planting and watering seeds every day.

After the vegetables grew, the hungry rabbit arrived near the garden and took some vegetables because he had no food and no one to help him. When the farmer discovered the rabbit, he learned that the rabbit was not stealing out of greed but because he was hungry.

Instead of becoming angry, the farmer chose to show kindness by sharing his food with the rabbit.

The farmer then allowed the rabbit to stay in the garden and help care for the vegetables. Through cooperation and mutual support, they worked together and eventually lived happily while sharing food. The story teaches students about the importance of helping those who experience hunger, sharing food with others, and taking responsibility in creating a caring community, reflecting the values of SDG-2: Zero Hunger.

c. Storybook and Illustration Plant

The storybook and illustration plan serve as a detailed technical guide for the development of the digital media. This plan translates the narrative into a page-by-page structure, specifying the focus of each scene, the visual details for the illustrations, and the English text to be displayed. By organizing the content in this manner, the researcher ensures that every visual and textual element consistently supports the delivery of SDG-2 values while maintaining a manageable reading duration for the students. Due to the comprehensive nature of the storyline and the detailed illustration descriptions, the full storyline of the story titled "The Farmer & The Rabbit"is provided in Appendix 1.

4.1.2.2 Digital Storybook Features and Storyboard

The digital storybook offers a number of interactive elements to meet the digital and pedagogical demands found during the needs analysis

stage. These elements are intended to improve fifth-grade children' reading behavioural engagement and aid in their English language learning. The main characteristics of the digital storybook are explained in this part, along with how the storyboard design incorporates them. Each section is explained in depth below.

a. Intro Menu Design

Before accessing the main plot content, viewers are greeted with the Intro Menu area, which acts as the main gateway. This section's design is straightforward but captivating, giving Fifth-graders an eye-catching experience. As seen in Figure, this page contains the primary book title as well as the first interactive instructions for beginning the digital reading experience, as shown in Figure 6. Below.

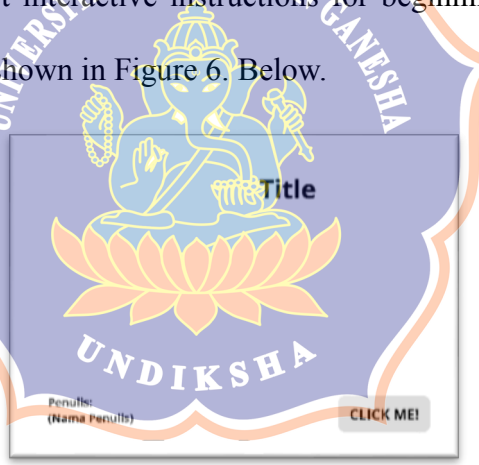


Figure 6. Intro Menu Design

The book title is written clearly in this entrance menu, and the author's name appears in the lower left corner as a way of giving credit. The initial navigation feature, the "Click Me!" button in the lower right corner, helps students develop their cognitive abilities while dealing with digital

media. Because of this design, visitors won't need complex directions to move from the introductory page to the main menu.

b. Audio and Visual Elements

In order to provide an appealing and engaging environment for the students before they begin reading, this function incorporates background music particularly into the Main Menu. However, audio narration for each text is purposefully left out throughout the tale phase to enable students to work on their independent reading abilities and concentrate solely on the written English content. As the students interact with the tale at their own pace, this design decision seeks to enhance their cognitive processing.

c. Main Menu

Users will be sent to the Main Menu after completing the Intro page. As the main navigational center, this page allows students to select the activities they want to engage in. Fifth-grade students may readily identify the purpose of each button without having cognitive issues due to the Main Menu's simple style and contrasting symbols, as shown in Figure 7 below

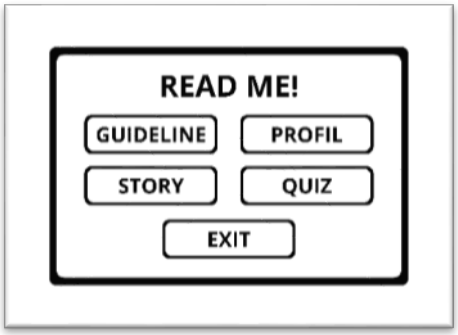


Figure 7. Main Menu

Guideline, Story, Profile, Quiz, and Exit are the five main navigation buttons. To achieve visual balancing, these buttons are positioned proportionately. Before interacting further with this digital storybook, readers are certain to comprehend the meaning of each function through the use of bold writing and simple English on each button.

d. Navigation Controls

The key features integrated into the design, as shown in the guideline above, are as follows:

1. Previous and Next Buttons: These buttons provide a self-paced individual reading experience by letting students turn the pages at their own time.
2. Read Me Button: Students may always go back to the main menu by using this button. It ensures a smooth transition between various portions of the application, which is especially helpful when they have completed reading the story or finishing the interactive tasks.
3. Hide/Close Button: When necessary, this keeps the screen clear and concentrated on the pictures and narrative text by enabling students to conceal or leave particular menus.
4. Interactive Translation (Pop-up): The "Pop-up" feature is an important aspect of this digital storybook. Without having to exit the app, students may tap each word in the narrative to see its translation, which reduces cognitive pressure and promotes improved vocabulary acquisition.

The guidelines and interactive translation describe the design and features of these navigation aids in Figure 8 and Figure 9.

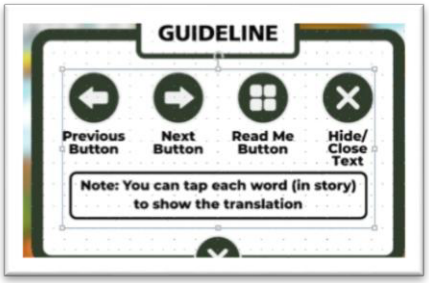


Figure 8. Guideline for Digital Storybook Features

Figure 9. Interactive Translation

Based on Figure 8, the purpose of the guideline function is to facilitate users' usage of the main navigation buttons, including Previous, Next, Read Me, and Hide/Close. The Interactive Translation function, which allows users to interact directly with the story's content to instantaneously display the translation, is implemented in Figure 9. The goal of these features are to increase target users' accessibility and language understanding.

e. Developer Profile

The main menu also includes a developer profile button, which allows users to know more about the person who developed the digital storybook. If the users are curious and want to know more about the developer, they can click on the “Profile” button to access the information.

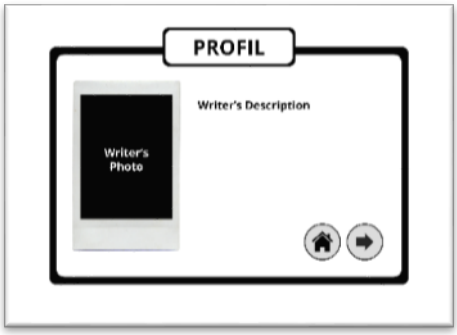


Figure 10. Profile Design

The developer profile is intended to build credibility and provide a personal touch to this digital learning tool. By providing clear author information and a profile photo, users should feel more connected to the source material and understand the background behind the creation of this digital storybook. Furthermore, the integration of navigation buttons on this page ensures users can easily return to the main menu or continue their activities.

f. Story

The Story section is the core of this media development, where the main narrative and visual illustrations are combined to convey the learning material. At this stage, the storyline developed in the storyboard is implemented into a series of interactive digital pages. The primary focus of the story section design is to create an immersive reading experience through a combination of easy to understand text and visual elements that support the story's context for students.

g. Quiz

After reading the story, students' comprehension is assessed using the Quiz section. This interactive feature presents questions that are relevant with accompanying visual components. The goal of using quizzes in digital storybooks is to give children an active learning experience in which they are not only passive readers but actively assess their language proficiency by completing the tasks.

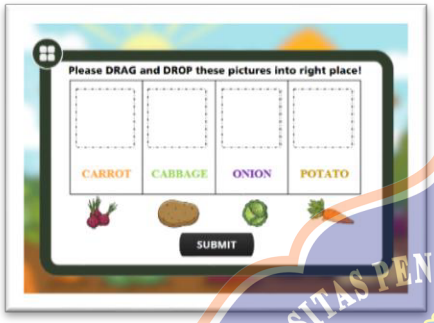


Figure 11. Quiz Interface

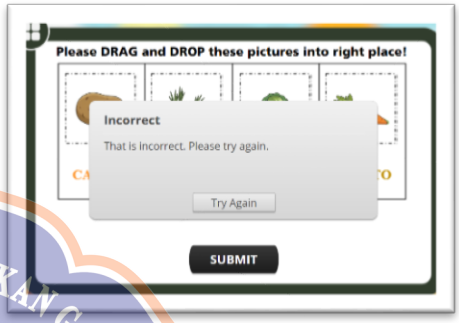


Figure 12. Incorrect Answer Feedback

Figure 13. Correct Answer Feedback

This quiz system has an instant feedback option for every response that students choose, as seen in the above image. The screen will provide "Correct!" message along with a navigation icon to go on to the "Continue" if a student selects the right response. Conversely, if the selected answer is incorrect, the screen will display "Try Again" allow students to

retry the quiz. This feedback mechanism is designed to motivate students and help them learn from their mistakes independently.

4.1.2.3 Development of an SDG-2 Digital Storybook

All previously created visual components are combined into a single, coherent media system throughout the development stage. At this point, the utility and interactivity of the digital platform take precedence over the creation of the image's appearance. The technological development of the digital storybook, including the software implementation in Tools, the revision process, and the finished product, is covered in the following parts.

The researcher started focusing on the web-based digital storybook after finishing the design phase and getting preliminary feedback. The goal of this phase was to turn static storyboards into useful, interactive web content. The whole visual production process, including sketching, line drawing, and high-quality digital rendering of all materials, was carried out by the researcher using Paint Tool SAI. Netlify was used as the main platform for hosting and delivering the web application in order to guarantee wide accessibility. Students may easily view the storybook using any web browser by using this arrangement. The many phases of this development process are described in more detail in the following sections.

Figure 14. Pant Tool SAI Application

Figure 15. Netlify Platform

In this phase, the two stated applications complement one another: Netlify provides the technological infrastructure needed to make the storybook available online, while Paint Tool SAI functions as the creative engine for creating the visual material. These tools work together to guarantee that the media is both visually appealing but also technologically reliable. Several technical procedures were carried out during the development of the digital storybook to guarantee that the final result corresponded with the established design requirements. The following is a thorough explanation:

1. Canvas Setup

Setting up the digital workspace was the starting point in the development process. By figuring out the precise measurements needed for a high-quality digital book, the researcher started a new project. The canvas was adjusted to a resolution of 3508 x 2480 pixels, as indicated in the parameters below, to guarantee that the images stay clean and sharp when seen on digital devices.

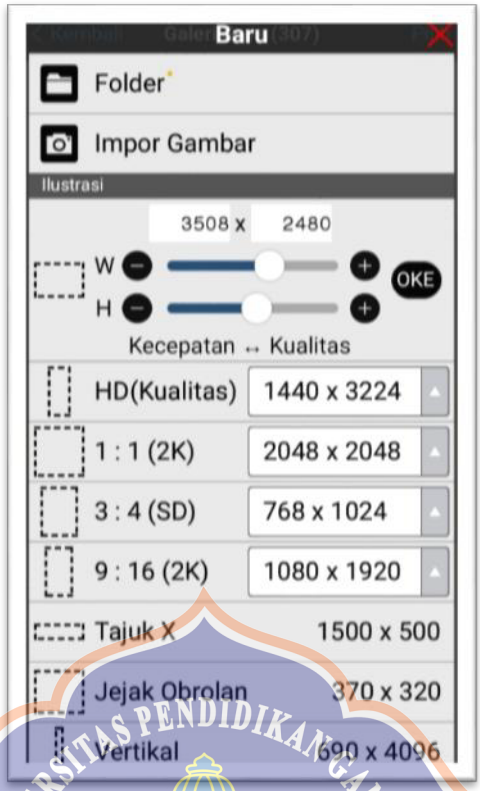


Figure 16. Canvas Setup in Paint Tool SAI

The researcher made sure that all 14 pages will have a constant aspect ratio and good visual clarity by setting these exact proportions at the outset.

2. Blank Canvas Initialization

A blank workspace was generated once the project settings were verified. The change from technical configuration to the artistic sketching process is symbolized by this step. All of the storybook's visual components, from the cover to the last page, are created from scratch on this white canvas.

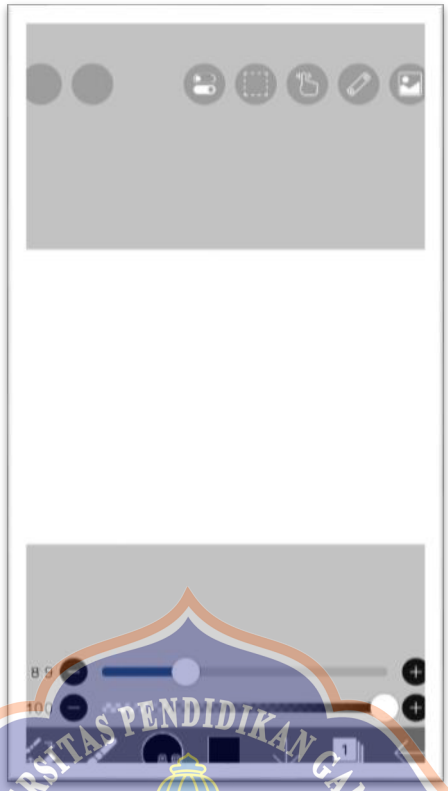


Figure 17. Blank Canvas Initialization

The researcher has the flexibility to start the manual drawing process in accordance with the pre-planned storyline because to this empty workspace.

3. Layer Management

To ensure an organized and efficient workflow, the researcher utilized the layer system within the application. Each component of the illustration, such as the sketch, line art, and coloring, was placed on separate layers. This technical organization is crucial for making precise adjustments to specific elements without interfering with the rest of the drawing.

Figure 18. Layer System Management

The use of multiple layers allowed the researcher to maintain control over the complexity of each page's composition throughout the production phase.

4. Initial Sketching

In this phase, the researcher began the manual drawing process by drafting the characters' anatomy and expressions. Using a digital pencil tool, the researcher focused on capturing the core emotions of the story's protagonists. For instance, the following image shows the initial draft of Rabbit's sad expression, which is a central emotional element of the narrative

Figure 19. Initial Character Sketching

These character drafts serve as the primary visual guide before proceeding to the more detailed inking.

5. Scene Composition

The final step in the sketching phase involved composing the entire scene for each page. With the completion of the full scene layout, the rough blueprint for the digital storybook page was finalized, making it ready for the next stages of line art and colouring. The visual production process for all 14 pages of the digital storybook was carried out. Each page was developed through three main phases: Sketching (composition design), Line Art (line emphasis), and Finalization (colouring and text integration). The following details the asset production process for each page below.

Figure 20. Cover Colorful Art

The cover page was developed to capture students' interest in reading. It shows the farmer and rabbit standing together in the vegetable garden. The final illustration drawn full color with high contrast was applied, and the title text, 'The Farmer & The Rabbit" was integrated to create a strong visual identity. The title and central placement of both characters emphasize the main message of the story cooperation, kindness, and sharing food can help address hunger and support SDG-2 (Zero Hunger). full color with high contrast was applied, and the title text, 'The Farmer & The Rabbit,' was integrated to create a strong visual identity.

Figure 21. Scene 1 Composition

This page depicts a dry and barren land where no plants can grow. Sketches and line art were used to arrange the cracked ground, leafless trees, and distant hills to create a balanced landscape composition. The coloring mainly uses brown, beige, and gray tones to emphasize drought and environmental hardship. Shading was applied to the ground and background elements to create depth and reinforce the atmosphere of food scarcity. The overall illustration conveys a sense of emptiness and desolation, introducing the problem of hunger in the story.

Figure 22. Scene 2 Composition

This scene presents a sad rabbit standing alone in the dry land. Sketches and line art were used to arrange the background landscape and the positioning of character to create a proportional layout. The final result emphasizes the depth of the space through shading on background and characters, while also creating a worried facial expression convey feelings of hunger and desperation.

Figure 23. Scene 3 Composition

This page depicts the farmer preparing to plant vegetables in his garden. Sketches and line art were used to position the farmer prominently in the foreground while the garden area, fence, and sky support the background composition. Bright colors such as blue, green, and yellow were applied to create a cheerful and hopeful atmosphere. Shading on the farmer and environmental elements enhances dimensionality. The farmer's smiling expression and energetic posture convey enthusiasm and readiness to grow food.

Figure 24. Scene 4 Composition

This page depicts the farmer introducing the vegetable seeds he plans to plant. Sketches and line art were used to emphasize the farmer as the central focus while arranging the garden environment proportionally around him. The bright sky and warm color palette create a positive mood. Shading on the seeds, soil, and character helps establish depth. The farmer's friendly facial expression reflects confidence and optimism about the planting process.

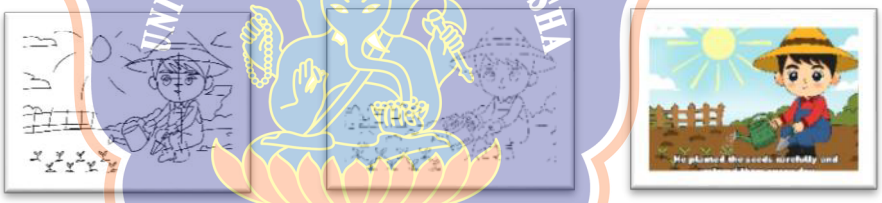


Figure 25. Scene 5 Composition

This page depicts the farmer planting and watering the seeds. Sketches and line art were used to arrange the farmer, watering can, and planting area in a balanced composition that directs attention to the gardening activity. Bright earthy colors and natural tones reinforce the agricultural setting. Shading was applied to the soil, plants, and character to create realistic depth. The farmer's focused expression and active body posture communicate responsibility and dedication

Figure 26. Scene 6 Composition

This page depicts the successful growth of healthy vegetables in the garden. Sketches and line art were used to position the vegetables prominently in the foreground while the farmer remains visible as an important supporting element. Vibrant green, yellow, and brown colors symbolize growth, abundance, and prosperity. The shading on the vegetables and background elements creates visual richness and depth. The farmer's happy expression reflects pride and satisfaction with the harvest.

Figure 27. Scene 7 Composition

This page depicts the rabbit arriving at the garden while feeling extremely hungry. Sketches and line art were used to place the rabbit near the center of the composition, with the vegetables surrounding it to emphasize the contrast between hunger and food availability. Bright garden colors are balanced with the rabbit's sorrowful appearance. Shading helps separate the rabbit from the background and creates spatial depth. The rabbit's sad eyes and weak posture express hunger and exhaustion.

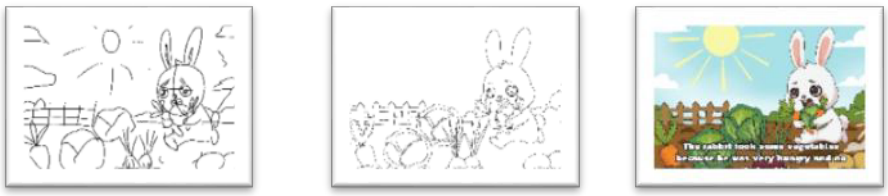


Figure 28. Scene 8 Composition

This page depicts the rabbit taking some vegetables from the garden because it is hungry. Sketches and line art were used to focus attention on the rabbit and the vegetables it is holding. Bright colors maintain the lively garden setting while emphasizing the freshness of the vegetables. Shading on the rabbit and crops enhances the three-dimensional appearance of the illustration. The rabbit's worried facial expression conveys guilt, fear, and desperation.

Figure 29. Scene 9 Composition

This page depicts the farmer discovering the rabbit with his vegetables. Sketches and line art were used to arrange both characters within the same frame, creating interaction and visual tension. The composition positions the farmer and rabbit close to each other to highlight the emerging conflict. Bright colors continue to maintain visual appeal while shading creates depth throughout the scene. The farmer's surprised expression and the rabbit's anxious face communicate uncertainty and concern.

Figure 30. Scene 10 Composition

This page depicts the rabbit explaining its situation to the farmer. Sketches and line art were used to place both characters at eye level, encouraging readers to focus on their communication. The garden setting remains visible in the background to maintain story continuity. Bright and warm colors create a supportive atmosphere despite the conflict. Shading enhances the dimensionality of the characters and objects. The rabbit's apologetic expression and the farmer's attentive look convey empathy and understanding.

Figure 31. Scene 11 Composition

This page depicts the farmer sharing food with the rabbit after hearing its story. Sketches and line art were used to position both characters around the shared vegetables, making the act of sharing the visual focal point. Warm and vibrant colors create a friendly and compassionate atmosphere. Shading adds depth to the characters and vegetables while highlighting the interaction. The farmer's kind smile and the rabbit's relieved expression communicate generosity, gratitude, and empathy.

Figure 32. Scene 12 Composition

This page depicts the farmer allowing the rabbit to stay and help maintain the garden. Sketches and line art were used to balance the positions of both characters to symbolize cooperation and teamwork. Bright natural colors strengthen the positive mood of the scene. Shading on the plants, tools, and characters enhances depth and visual harmony. The cheerful expressions of both characters reflect mutual understanding and collaboration.

Figure 33. Scene 13 Composition

This page depicts the farmer and rabbit living together peacefully and sharing food. Sketches and line art were used to place both characters side by side within the flourishing garden, emphasizing friendship and harmony. The vibrant colors of the vegetables and sunny background create a joyful atmosphere. Shading provides depth and highlights the abundance of the garden. The smiling facial expressions of both characters communicate happiness, friendship, and gratitude.

The completion of these five technical steps marks the successful transformation of manual storyboards into high-quality digital assets. By

meticulously managing the process from canvas setup to full scene composition in Paint Tool SAI, the researcher ensured that each of the 14 pages possesses a strong visual foundation and consistent artistic style. These finalized sketches and layouts serve as the primary raw material, which is now ready to be processed further into a functional and interactive digital format.

Once all visual assets were fully rendered and finalized, the next critical phase was the digital transformation and distribution of the storybook. This phase involved converting static illustrations into a responsive and easy-to-navigate web-based interface. To achieve this, the researchers used Netlify as the primary platform for hosting the media, ensuring that the storybook was no longer just a collection of images, but a complete digital experience accessible to students through a web browser. The following sections detail the technical process for bringing these visuals to the digital realm.

1) Initial Project Setup and Workspace Activation

After finalizing all visual assets in Paint Tool SAI, the researcher began the integration phase by creating a new project in Articulate Storyline. This phase is essential to establish the foundation of the digital application, ensuring all subsequent design elements are contained within a structured workspace. By starting with a “Starting Scene,” the researcher prepares the canvas for content integration.

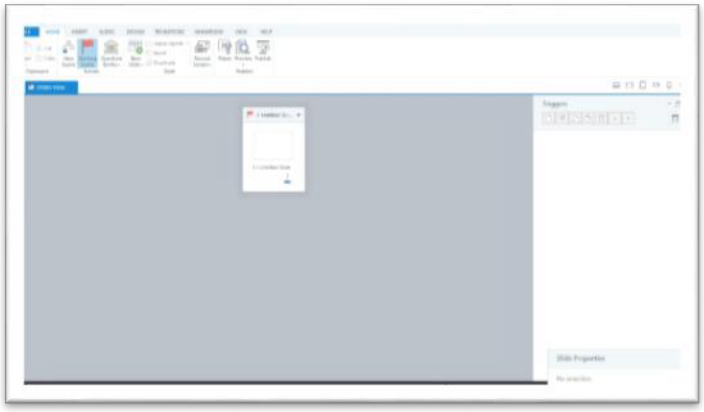


Figure 34. Initial Workspace and Starting Scene Initialization

As illustrated in the interface, the software provides a centralized "Story View" which acts as the primary management console. This setup allows for a clear overview of the project's hierarchy, enabling the researcher to organize the flow of the storybook from the very beginning. This clean start is vital for maintaining technical consistency as the project scales in complexity.

2) Structural Scene Organization

The second step involved organizing the narrative flow by creating multiple scenes. Each scene was specifically named to represent a section of the media, such as Opening, Read Me (Home), Guideline, Profile, Story, Quiz, and Exit. This structured approach is vital to ensure that the navigation between the story pages and the supplementary menus functions logically.

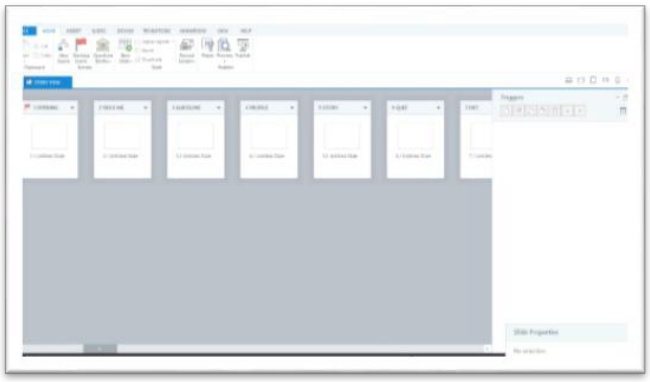


Figure 35. Scene Sequencing and Navigation Structure

By categorizing content into these specific modules, the development process becomes more manageable. This modular approach not only aids the researcher in building the application but also ensures that the end-user can navigate through the digital storybook without confusion.

3) Slide Initialization and Trigger Setup

Once the scenes were structured, the researcher moved to the individual slide development. This involves setting up a blank canvas for each page where the Paint Tool SAI assets will be imported. Additionally, this stage focuses on the 'Triggers' panel to define how the user interacts with the buttons, such as moving to the next or previous page.

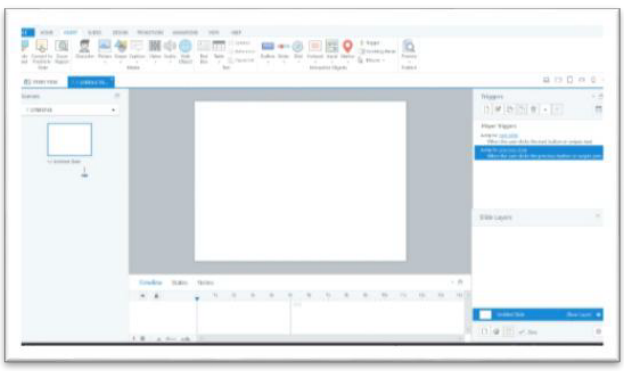


Figure 36. Slide Workspace and Interaction Triggers

As shown in the slide view, the researcher has access to various "Interactive Objects" such as buttons and markers. The "Triggers" panel on the right side of the interface is activated to define the logic of the slide, such as "Jump to next slide" or "Jump to previous slide." This preparation is critical for ensuring that the transition between the previously organized scenes functions seamlessly during the final user experience.

4) Interface Interaction and Navigation Setup

After setting up the initial scene, the researcher focuses on configuring the interactivity of the cover page. This step is crucial for establishing the user's first point of engagement with the storybook. By assigning specific triggers to visual elements, the static cover transforms into a functional gateway to the content.

Figure 37. Interaction and Trigger Configuration on the Cover Page

As shown in the interface, a “Jump to Slide” trigger is applied to the main interaction button. This ensures that when the user clicks the “CLICK ME” prompt, the application seamlessly navigates to the next scene. Additionally, background audio is integrated into the timeline to play automatically, providing an immersive auditory experience from the moment the project starts.

5) User Data Input and Validation Logic

The next phase involves the development of the "Welcome Screen," designed to personalize the user experience. In this stage, interactive text fields are implemented to capture essential user information, specifically their Name and Class,

Figure 38. User Input Fields

Figure 39. Conditional Trigger Validation

This setup utilizes conditional logic to ensure data integrity. The “START” button is configured with dual triggers: it will only advance to the next slide if both the Name and Class fields are populated. If the fields remain empty, a secondary layer command appear to remind to fill the name and class first, prompting the user to complete the form. This systematic approach ensures that no user proceeds without the required identification, maintaining the flow of the interactive story.

6) Main Menu Dashboard and Interactive Navigation Setup

The development continues with the creation of the "READ ME!" slide, which serves as the central hub or main menu for the interactive storybook. This dashboard is designed to provide users with clear access points to all major sections of the application. By centralizing navigation, the researcher ensures that the user can explore the content in a non-linear fashion according to their needs.

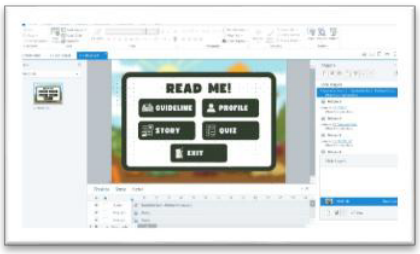


Figure 40. User Input Fields

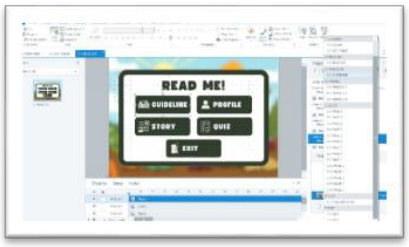


Figure 41. Conditional Trigger Validation

As depicted in the interface, the dashboard features several interactive buttons: “GUIDELINE,” “PROFILE,” “STORY,” “QUIZ,” and “EXIT.” Each button is configured with specific “Jump to Slide” triggers that link directly to their respective scenes, such as jumping to Scene 5.1 for the story or Scene 3.1 for guidelines. This setup also includes background audio synchronization that continues to play upon the timeline’s start, maintaining auditory consistency. This integrated navigation system is vital for providing a seamless user experience, allowing for efficient transitions between the informational and narrative components of the project.

7) Development of the Instructional Guideline Interface

In this stage, the researcher develops the “GUIDELINE” slide to provide users with a clear understanding of the application’s interactive elements. This instructional interface serves as a manual, explaining the function of various icons and navigation tools used throughout the digital storybook. Clear guidance at this stage is essential to minimize user error and enhance overall usability.

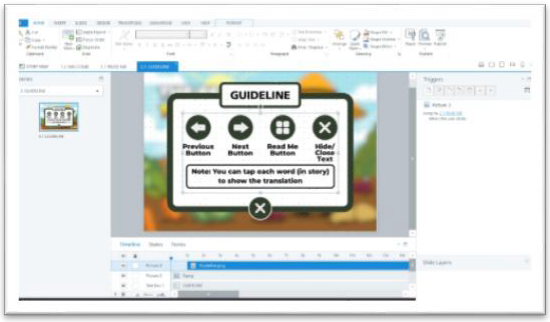


Figure 42. User Guideline Interface and Back-to-Menu Trigger

As shown in the interface, the guideline page details the functions of the "Previous," "Next," "Read Me," and "Hide/Close" buttons. Additionally, a specific instruction is provided regarding the interactive translation feature within the story. To ensure the user can return to the main dashboard after reading the instructions, a "Jump to 2.1 READ ME" trigger is assigned to the close button (X). This configuration ensures that the instructional flow is cyclical and user-friendly, allowing users to feel confident before proceeding to the story or quiz sections.

8) Author Profile

In this stage, the researcher develops the "PROFILE" scene, which consists of three interconnected slides dedicated to the author and the academic supervisors. This section is vital for establishing the credibility of the digital storybook and providing users with background information about the creative and academic team behind the project. By using a consistent layout across these slides, the researcher maintains visual harmony within the application.

Figure 43. Sequential Profile Slides and Inter-slide Navigation Triggers

As shown in the slides (Author 1, 2, and 3), each page features a portrait, a brief biographical description, and navigation icons. The researcher implemented specific "Jump to Slide" triggers to allow users to move seamlessly between profiles; for instance, navigation arrows link "Author 1" to "Author 2" and subsequently to "Author 3." Additionally, each slide is equipped with a "Home" icon triggered to "Jump to 2.1 READ ME," ensuring that the user can return to the main dashboard at any point. This sequential setup ensures that all contributors are properly acknowledged while keeping the user interface intuitive and easy to navigate.

9) Interactive Story Content and Translation Layer Development

The core of the application lies in the development of the "STORY" scene, where the narrative is presented through a series of illustrated slides. In this stage, the researcher focuses on making the story not only

readable but also interactive by incorporating a “Translation Feature.” This feature is designed to support language learning by allowing users to access vocabulary support directly within the narrative context.

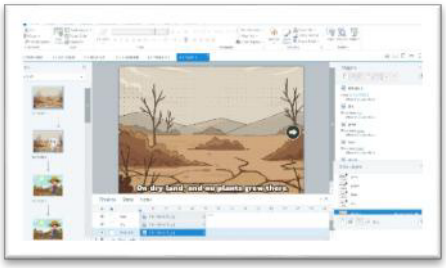


Figure 44. Interactive Story Layout

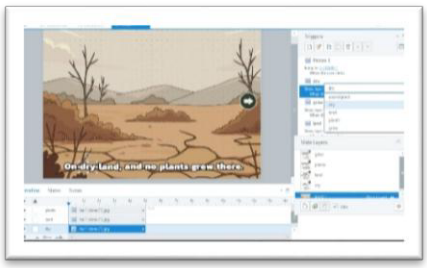


Figure 45. Word-Based Translation Triggers

As illustrated in the Story Page 1 interface, the slide contains the narrative text “On dry land, and no plants grew there” The researcher implemented a sophisticated interaction where specific words act as triggers. By clicking on underlined or targeted words, a corresponding “Slide Layer” (such as the “dry” layers shown in the trigger panel) is activated to display the translation or meaning. Furthermore, a navigation arrow is placed on the right side of the slide, assigned with a “Jump to Slide 5.2” trigger to move the user forward in the story. This combination of narrative flow and interactive linguistic support creates an engaging environment for students to improve their English skills at their own pace.

10) Interactive Story Content and Translation Layer Development

To enhance the learning aspect of the interactive storybook, the researcher developed specific “Slide Layers” that function as localized translation windows. This method allows the main story to remain visually clean while providing immediate assistance when a user encounters a

difficult English word. By separating the translation into layers, the application creates a non-intrusive interactive learning environment.

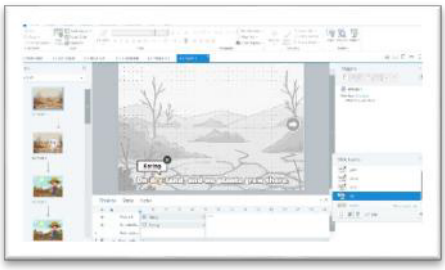


Figure 46. Configuration of Translation Layers for Specific Vocabulary Support

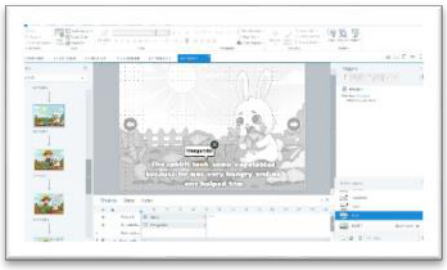


Figure 47. Configuration of Translation Layers for Specific Vocabulary Support

As demonstrated in the interface, each targeted word is linked to a unique layer, such as the "dry" or "took" layers. When a user interacts with a word in the main narrative, the software is triggered to show the corresponding layer, which displays the Indonesian translation, such as "*kering*" for dry and "mengambil" for took, in a speech bubble format. The researcher also implemented a "Hide Layer" trigger on the close (X) button within each bubble, allowing the user to return to the base story page effortlessly. This technical setup ensures that the transition between reading the story and learning new vocabulary is fluid and responsive to the user's input.

This interactive translation mechanism is implemented consistently across all narrative slides, from the opening page to the end. Each slide in the "STORY" scene follows this identical technical structure, where key vocabulary words are linked to specific translation layers to aid user comprehension. By maintaining this consistent interaction model throughout the 14 page story, the researchers ensured a predictable and

stable learning experience, allowing students to focus on language acquisition without having to learn a new navigation method for each page.

11) Final Story Scene and Return to Dashboard Navigation

After completed the entire narrative sequence from pages 1 to 14, the final step in the story scene is to direct the user back to the main menu. This is crucial so that the application flow doesn't stop at the last page, but rather allows users to access other features, such as evaluation quizzes or author profiles, through the central dashboard.

Figure 48. Final Story Page and Home Navigation Trigger

As seen on the interface of the last page of the story, the researchers embedded a Home button strategically located. They configured the button with a "Jump to Slide 2.1 READ ME" trigger that activates when the user clicks it. This function ensures a closed and efficient navigation cycle, where once the user has finished reading the entire storybook, they are automatically redirected back to the main menu to proceed to the next learning stage.

12) Interactive Quiz Construction and Self-Assessment Mechanism

Once the user is redirected to the main menu, the next crucial step is implementing the "QUIZ" as a self-assessment tool. Unlike formal tests, this section is designed to interactively validate students' understanding of the vocabulary they have learned. By using the quiz feature, the app provides a space for students to practice their knowledge in a fun, low-pressure format, which is a crucial element in building confidence when learning a foreign language.

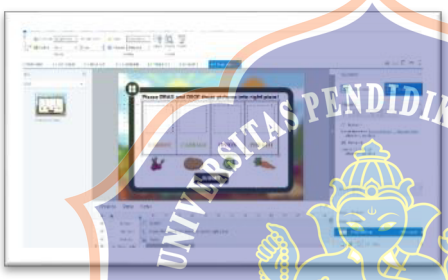


Figure 49. Interactive Quiz Question Interface

Figure 50. Incorrect Answer Feedback

Figure 51. Correct Answer Feedback

As illustrated in the interface sequence, the researchers designed a quiz with a direct feedback system. Each question is accompanied by an answer layer; “Incorrect” layer appears to motivate students to try again, and “Correct” layer appears, providing positive reinforcement.

13) Personalized Self-Reflection Interaction

Before concluding the session, the researchers designed a personalized reflection page. This step is crucial in learning media to build emotional connection with users and ensure students are aware of the learning process they have just gone through, particularly in understanding new vocabulary.

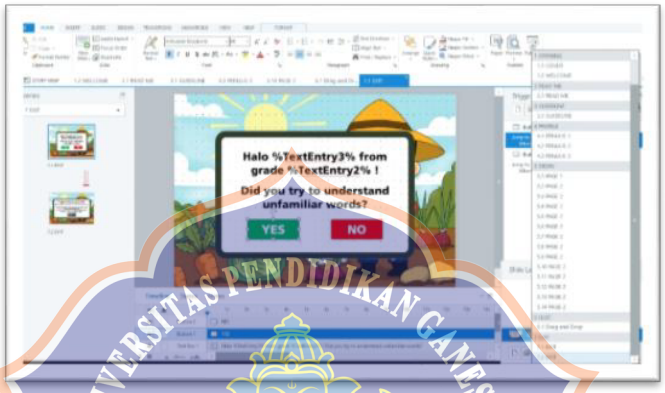


Figure 52. Personalized Reflection Page

As seen in the interface, the researcher used a text variable system to greet users personally by displaying the name and class entered at the beginning of the application, for example: “Hello [Name] from Grade [Class]”. This page presents a reflective question: “Did you try to understand unfamiliar words?” The researcher configured the “YES” and “NO” buttons as interaction triggers that require students to assess their own efforts. The use of this personal variable aims to provide appreciation to students individually, so that the experience of using this interactive storybook feels more exclusive and meaningful for each user.

14) Interactive Blurb Development

The final stage of content development is the creation of the "BLURB" page. This page serves as a summary of the story and a closing moral of the narrative.

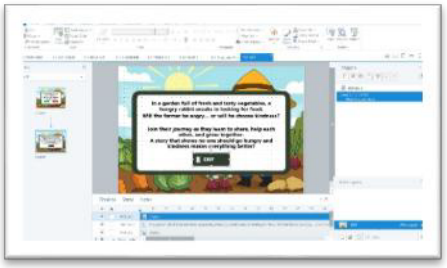


Figure 53. Interactive Blurb Interface with Custom Exit Navigation

As illustrated in Figure 4.39, the blurb page presents a closing text that summarizes the story's main message. As a final step to complete the application's navigation cycle, the researchers embedded an "EXIT" button in the bottom right corner. This button is configured with the "Jump to Slide 1.1 COVER" trigger. This way, when users finish reading the blurb and click the button, the application does not immediately close permanently but returns to the main cover page. This allows the application to be reused by other students or allows the same user to restart the material from the beginning, thus creating a continuous loop.

Overall, the development process for this Interactive Digital Storybook media encompasses the transformation of conventional learning materials into a dynamic, user-centered digital format. Starting with the initialization of the application structure and interface navigation settings, researchers systematically integrated various interactive elements such as personal input variables, a slide-layer-based vocabulary translation feature, and a self-evaluation system and student metacognitive reflection. Visual and

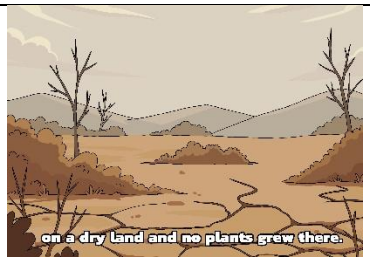
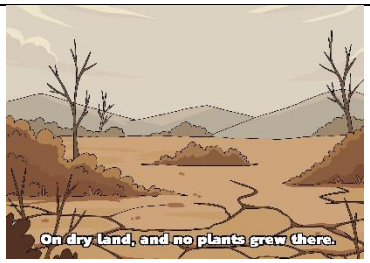
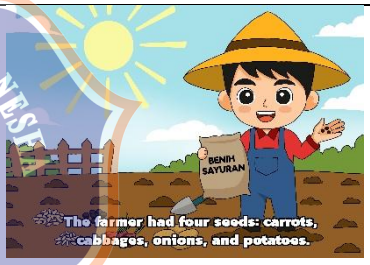
functional consistency applied from the cover page to the blurb section ensures that every feature, including transitions between scenes and instant feedback, works synergistically to support English vocabulary mastery. Through this comprehensive technical integration, the resulting product is not just a static digital storybook, but rather a self-learning ecosystem that is able to adjust interactions based on user input and provide real-time linguistic assistance.

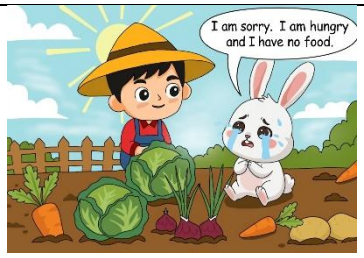
4.1.2.4 Revision of The Product

The initial prototype of the digital storybook was developed, it underwent a comprehensive evaluation process through expert validation. This stage was crucial to ensure the product's feasibility, pedagogical quality, and technical consistency before being tested in a broader educational context. The revisions were based on constructive feedback, suggestions, and criticisms provided by the experts concerning several aspects, including content accuracy, linguistic appropriateness, and visual design.

The following points outline specific improvements made to the product to address identified weaknesses and to increase its effectiveness as a learning media to promote SDG-2 values and reading literacy.

Table 16. Revision Product

Page	Before	After
Page 1		
Page 2		
Page 4		
Page 7		
Page 9		

Page 10		
Page 11		

A refinement was made to the storytelling depth in Scene 10 & 11. Initially, the scene only featured the narrator's description. It was identified that adding direct monolog would make the scene more immersive and provide a clearer context for the students. To address this, the researcher added a speech bubble for Rabbit and Farmer, containing the text: *"I am sorry. I am hungry and I have no food"* for The Rabbit and "Don't steal again" for The Farmer. This addition serves two purposes: first, it provides a concrete example of the "reading" activity mentioned in the narration. Second, it reinforces the educational theme by incorporating a simple scientific fact, which aligns with the literacy goals of the media. By adding this monolog bubble chat, the interaction between the characters becomes more vivid and easier for young learners to follow.

The revision process focused on maintaining the consistency of the story's tense and semantic meaning. During the final review of the

development stage, a grammatical error and sentence case was discovered. For example in page 4, the original text used the singular word of the seeds mention, which was contextually incorrect and did not align with the narrative.

To accurately describe the action of introducing the seeds, the word was corrected to plural noun for the seeds, for instance carrots, cabbages, onions and potatoes). This refinement was vital because, in a literacy-based learning tool, even a minor grammatically errors can distort the students' understanding of grammar and vocabulary. By correcting this, the researcher ensured that the “Final Product” provides a clear and accurate linguistic model for students, supporting their reading literacy development without confusion.

These improvements, ranging from critical linguistic corrections to enriching narrative dialogue, were crucial in elevating the prototype into a more effective and effective learning tool. Researchers ensured that the digital storybook provided accurate language input and an engaging and immersive reading experience for students. Iterative improvements throughout this development phase successfully bridged the gap between the initial design and pedagogical requirements, ultimately resulting in a final product that was educationally sound, visually coherent, and ready for implementation.

4.1.3 The Quality of the Developed SDG-2 Digital Storybook as Evaluated by Expert

This section presents the findings related to the third research question, which focuses on evaluating the quality of the SDG-2 digital storybook developed in this study. The product was reviewed by two experts in English Language Education through the use of a structured validation instrument. The evaluation examined two key dimensions: the quality characteristics of an effective digital storybook and the extent to which the storybook aligns with SDG-2 learning objectives. The results of the expert assessment showed that the digital storybook achieved a mean score of 103 for digital storybook quality and 20 for SDG-2 learning objectives. Based on the qualification standards established by Nurkancana (1992), both scores are categorized as excellent. These findings suggest that the developed storybook fulfills the expected quality criteria for digital storybooks while successfully incorporating SDG-2 educational content. A detailed explanation of the evaluation outcomes for each assessment aspect is presented in the following sections.

4.1.3.1. Quality in Terms of Criteria of Digital Storybook

The third aspect, namely intercultural awareness, is reflected in the story through the promotion of positive values such as helping, caring for, and respecting others. The interactive dimension is supported by features including pop-up vocabulary explanations and clickable elements that encourage students' active involvement while reading. Meanwhile, the child-friendly aspect is evident in the use of age-appropriate language,

suitable text length, and clear instructions that support students' comprehension.

Furthermore, the accessibility aspect is demonstrated through the inclusion of visual illustrations and vocabulary support that assist students in understanding the story, although one expert noted the absence of audio narration on the story pages. Regarding personalization, the digital storybook provides opportunities for students to express their own opinions and reflections at the end of the story. The creative aspect is represented through colorful and expressive illustrations that enhance the overall reading experience. Finally, the social aspect is reflected in the interactions among characters, which model positive behaviours such as sharing, cooperation, and helping others. Taken together, the successful integration of these nine aspects indicates that the digital storybook satisfies the criteria of a high-quality digital learning resource and is categorized as Excellent according to the qualification standards proposed by Nurkancana (1992). A more detailed discussion of these findings is presented in the following section.

a) Result Expert 1

Figure 54 displays the descriptive statistical results of Expert 1's evaluation. The data indicate that Expert 1 awarded a total score of 104 out of a maximum possible score of 108. The statistical analysis shows that the mean, median, and mode are all 104.00, demonstrating consistency in the assessment results. Overall, the findings suggest that

the developed digital storybook successfully fulfills the majority of the established digital storybook criteria based on Expert 1's evaluation.

Statistics

Total_Expert1

N	Valid	1
	Missing	0
Mean		104.0000
Median		104.0000
Mode		104.00
Range		.00
Minimum		104.00
Maximum		104.00

Figure 54. Descriptive Statistics of Expert 1 Digital Storybook Criteria

b) Result From Expert 2

Figure 55 presents the descriptive statistical results of Expert 2's evaluation. The data indicate that Expert 2 awarded a total score of 102 out of a maximum possible score of 108. The statistical analysis shows that the mean, median, and mode are all 102.00, reflecting a consistent pattern in the assessment. Compared with Expert 1, Expert 2 assigned a slightly lower overall score. Nevertheless, the results indicate that the developed digital storybook meets the established criteria at a high level based on Expert 2's evaluation.

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Statistics

EXPERT2

N	Valid	1
	Missing	0
Mean		102.0000
Median		102.0000
Mode		102.00
Minimum		102.00
Maximum		102.00

Figure 55. Descriptive Statistics of Expert 2 Digital Storybook Criteria

c) Overall Mean Score of Experts

After obtaining the total scores from both experts, the overall mean score was calculated to determine the general evaluation result using the arithmetic mean formula.

$$\bar{X} = \frac{\sum X}{N}$$

$\bar{X}$ = Mean score

$\sum X$ = Total score from all experts

N = Number of experts

Expert 1 assigned a total score of 104, while Expert 2 awarded a total score of 102. The calculation of the mean score is presented as follows:

$$\bar{X} = \frac{104 + 102}{2}$$

$$\bar{X} = \frac{206}{2}$$

$$\bar{X} = 103$$

Based on the calculation, the developed digital storybook achieved an average score of 103 in terms of the digital storybook criteria.

d) Calculation Using Nurkancana's Qualification Criteria

To determine the qualification level of the product, the mean score was the converted using Nurkancana (1992) qualification formula.

Table 17. Qualification Criteria Based on Nurkancana (1992)

Value interval	General criteria
X ≥ Mi + 1.5Sdi	Excellent
Mi + 0.5Sdi ≤X < Mi +1.5Sdi	Good
Mi - 0.5Sdi ≤X < Mi + 0.5Sdi	Average
Mi - 1.5Sdi ≤X < Mi - 0.5Sdi	Below average
X < Mi - 1.5Sdi	Poor

1. Determining the Ideal Scores

   The validation instrument consists of 27 items with a scale of 1-4.

   Therefore:

   Maximum ideal score = 27 x 4 = 108

   Minimum ideal score = 27 x 1 = 27

2. Calculating the Ideal Mean (Mi)

   According to Nurkancana (1992), the Ideal Mean (Mi) is calculated using:

$$Mi = \frac{Maximum + Minimum}{2}$$

$$Mi = \frac{108 + 27}{2}$$

$$Mi = \frac{135}{2}$$

$$Mi = 67.5$$

3. Calculating the Ideal Standard Deviation (SDi)

   The Ideal Standard Deviation (SDi) is calculated using:

$$SDi = \frac{1}{3}\ Mi$$

$$SDi = \frac{1}{3}\ (67.5)$$

$$SDi = 22.5$$

4. Determining the Qualification Interval

   First, the upper boundary for the Excellent category is calculated:

$$Mi + 1.5SDi$$

$$= 67.5 + (1.5\ x\ 22.5)$$

$$= 67.5 + 33.75$$

$$= 101.25$$

Table 18 Criteria of Digital Storybook Rating Score

Value interval	General criteria
X ≥ 101.25	Excellent
89.25 ≤X < 101.25	Good
67.5 ≤X < 89.25	Average
55.5 ≤X < 67.5	Below average
X < 55.5	Poor

Based on the qualification table, the developed product is classified as Excellent, as its mean score of 103.00 exceeds the minimum score required for that category, which is 101.25. This result indicates that the digital storybook successfully meets the established criteria and can therefore be categorized as having an Excellent level of quality in terms of digital storybook criteria.

4.1.3.2 Quality in Terms of SDG- 2 Learning Objective

The evaluation results indicate that the developed digital storybook achieved an **Excellent** level in terms of integrating SDG-2 learning objectives. The assessment was conducted based on five indicators related to addressing hunger and promoting food-sharing behaviours. Throughout the story, the characters model positive actions such as sharing food and helping individuals who are experiencing hunger, enabling students to better understand the concept of Zero Hunger. The story also introduces practical actions that students can apply in their daily lives, including offering food to others and sharing available resources.

Furthermore, the narrative highlights the importance of both personal and collective responsibility in addressing hunger by portraying cooperation, empathy, and helping behaviours among the characters. Through these experiences, students are encouraged to reflect on their own attitudes and actions toward supporting others in need. The story also fosters values of care, generosity, and social responsibility by emphasizing kindness and concern for people facing food insecurity. Overall, the findings demonstrate that SDG-2 values have been effectively embedded within the

storyline, resulting in an Excellent classification. The detailed evaluation results are presented in the following section:

a) Result from Expert 1

Figure 56 presents the descriptive statistical results of Expert 1's evaluation. The data show that Expert 1 awarded a total score of 20 out of the maximum possible score of 20. The statistical analysis indicates that the mean, median, and mode are all 20.00, demonstrating complete consistency in the assessment. These results suggest that the developed digital storybook successfully fulfills the SDG-2 learning objectives based on Expert 1's evaluation.

Statistics

Total_Expert1

N	Valid	1
	Missing	0
Mean		20.0000
Median		20.0000
Mode		20.00
Range		.00
Minimum		20.00
Maximum		20.00

Figure 56. Descriptive Statistics of Expert 1 SDG-2 Learning Objective

b) Result from Expert 2

Figure 57 presents the descriptive statistical results of Expert 2's evaluation. The data indicate that Expert 2 awarded a total score of 20 out of the maximum possible score of 20. The statistical analysis shows that the mean, median, and mode are all 20.00, reflecting complete consistency in the assessment. These findings suggest that the

developed digital storybook effectively addresses the SDG-2 learning objectives based on Expert 2's evaluation.

Statistics

Total_Expert2

N	Valid	1
	Missing	0
Mean		20.0000
Median		20.0000
Mode		20.00
Range		.00
Minimum		20.00
Maximum		20.00

Figure 57. Descriptive Statistics of Expert 2 SDG-2 Learning Objective

c) Overall Mean Score

After obtaining the total scores from both experts, the overall mean score was calculated to determine the general evaluation result. The calculation was conducted using the arithmetic mean formula in descriptive statistics, as presented below:

$$\bar{X} = \frac{\sum X}{N}$$

$\bar{X}$ = Mean score

$\sum X$ = Total score from all experts

N = Number of experts

In this evaluation, both Expert 1 and Expert 2 awarded a total score of 20. Therefore, the calculation of the overall mean score is presented below:

$$\bar{X} = \frac{20 + 20}{2}$$

$$\bar{X} = \frac{40}{2}$$

$$\bar{X} = 20$$

Based on the calculation, the developed digital storybook achieved an average score of 20 in terms of SDG-2 learning objectives.

d) Calculation Using Nurkancana Qualification Criteria

To determine the qualification level of the product, the obtained mean score was converted using the qualification criteria proposed by Nurkancana (1992).

Table 19. Qualification Criteria Based on Nurkancana (1992)

Value interval	General criteria
X ≥ Mi + 1.5Sdi	Excellent
Mi + 0.5Sdi ≤X < Mi +1.5Sdi	Good
Mi - 0.5Sdi ≤X < Mi + 0.5Sdi	Average
Mi - 1.5Sdi ≤X < Mi - 0.5Sdi	Below average
X < Mi - 1.5Sdi	Poor

1. Determining The Ideal Score

The validation instrument consisted of five items assessed using a four-point rating scale ranging from 1 to 4. Accordingly, the ideal scores were calculated to obtain the ideal mean (Mi) and ideal standard deviation (SDi):

Maximum ideal score = 5 x 4 = 20

Minimum ideal score = 5 x 1 = 5

2. Calculating the Ideal Mean (Mi)

According to Nurkancana (1992), the ideal mean (Mi) is calculated using the following formula:

$$\text{Mi} = \frac{\text{Maximum} + \text{Minimum}}{2}$$

$$\text{Mi} = \frac{20 + 5}{2}$$

$$\text{Mi} = \frac{25}{2}$$

$$\text{Mi} = 12.5$$

3. Calculating the Ideal Standard Deviation (SDi)

The Ideal Standard Deviation (SDi) is calculated using:

$$\text{SDi} = \frac{1}{3}\ \text{Mi}$$

$$\text{SDi} = \frac{1}{3}\ (12.5)$$

$$\text{SDi} = 4.17$$

Based on the calculated values of Mi and SDi, the qualification criteria for interpreting the obtained scores were established, as presented in Table 20.

Table 20. SDG-2 Learning Objective Rating Score

Value Interval	Criteria
X ≥ 18.76	Excellent
14.59 ≤ X < 18.76	Good
10.41 ≤ X < 14.59	Average
6.24 ≤ X < 10.41	Below Average
X < 6.24	Poor

Based on the rate of score table above, the qualification of the product was determined by comparing the obtained mean score ($\bar{X}$ = 20) with the interval criteria.

The calculation is presented as follows:

= X ≥ Mi + 1.5 Sdi

= 20 ≥ 12.5 + (1.5 x 4.17)

= 20 ≥ 12.5 + 6.26

= 20 ≥ 18.76

Since the obtained mean score 20 is higher than 18.76, it falls within the interval of 20 ≥ 18.76, the developed SDG-2 Learning Objective is categorized as Excellent.

In conclusion, the expert validation results demonstrate that the developed SDG-2 digital storybook possesses a very high level of overall quality. In terms of digital storybook criteria, the product achieved a mean score of 103, which falls into the "Excellent" category based on the qualification standards proposed by Nurkancana (1992). This result indicates that the storybook fulfils the characteristics of a well-designed digital learning medium.

Furthermore, in terms of SDG-2 learning objective alignment, the product obtained a mean score of 20, which is also categorized as "Excellent." This finding confirms that the integration of SDG-2 values within the narrative and instructional components is highly appropriate and effectively embedded. So, these findings suggest that the developed digital storybook is pedagogically appropriate, technically well designed, and well aligned with the intended SDG-2 learning objectives, making it suitable for implementation in fifth grade reading activities.

4.1.4 The Quality of the Reading Behavioural Engagement as evaluated by Teacher

The evaluation results indicate that developed digital storybook achieved a good level of quality in terms of reading behavioural engagement. Based on the teacher's evaluation the total score obtained was 77, with the mean, median, and mode all recorded at 77.00, indicating consistently high scoring. The range was 0.00 with both minimum and maximum values also 77.00. Furthermore, the overall mean score of 77 is slightly lower than 78.75, which is the minimum score for the excellent category based on Nurkancana (1992). This means that the digital storybook is categorized as good in supporting students reading behavioural engagement.

4.1.4.1 The Quality in terms of Reading Behavioural Engagement Result from Teacher

The findings from teacher evaluation supported by classroom observation during the trial session, shows several dimensions of reading behavioural engagement were demonstrated by the students while using the digital storybook. First, the dimension of active participation and positive conduct is reflected in students' willingness to be involved in the reading activity. This is supported by the trial results, where most students raised their hands and show their interest in reading story. Second, the dimension of effort is reflected in students' willingness to try reading where some students voluntarily to read aloud the story by for their friends. Third, the dimension of interaction with the text is reflected in students' engagement

with the features of the digital storybook where students excitedly try the click able features. Fifth, the dimension of attention is reflected in students' ability to focus on the story content, which supported by the trial session, where the students can answer the question and read the story until the end.

Overall, the teacher's evaluation shows that the digital storybook successfully supports multiple dimensions of reading behavioural engagement, which is further strengthened by the result of the trial session in the following result.

Statistics

Teacher

N	Valid	1
	Missing	0
Mean		77.0000
Median		77.0000
Mode		77.00
Range		.00
Minimum		77.00
Maximum		77.00

Figure 58. Descriptive statistics of Teacher Evaluation

a) Overall Mean Score

The general evaluation was calculated by averaging the total scores provided by the teacher using the standard formula:

$$\bar{X} = \frac{\sum X}{N}$$

$\bar{X}$ = Mean score

$\sum X$ = Total score from Teacher

N = Number of Teacher

In this evaluation, the expert assigned score of 77.

Therefore, the mean score is calculated as follows:

$$\bar{X} = \frac{\sum X}{N}$$

$$\bar{X} = \frac{77}{1}$$

$$= 77$$

Thus, the overall mean score of the digital storybook in terms of reading behavioural engagement in 77.

b) Calculating using Nurkancana Qualification Criteria

To determine the quality level of the product, the obtained mean score was compared with Nurkanacana (1992) standard intervals.

Table 21. Qualification Criteria Based on Nurkancana (1992)

Value interval	General criteria
X ≥ Mi + 1.5Sdi	Excellent
Mi + 0.5Sdi ≤X < Mi +1.5Sdi	Good
Mi - 0.5Sdi ≤X < Mi + 0.5Sdi	Average
Mi - 1.5Sdi ≤X < Mi - 0.5Sdi	Below average
X < Mi - 1.5Sdi	Poor

c) Determining the Ideal Score

The validation instrument contained 21 items rated on a scale of 1-4. The ideal maximum and minimum scores were calculated as follows.

Maximum ideal score = 21 x 4 = 84

Minimum ideal score = 21 x 1 = 21

d) Calculating Ideal Mean (Mi)

The Mean Ideal is calculated using:

$$\text{Mi} = \frac{\text{Maximum} + \text{Minimum}}{2}$$

$$\text{Mi} = \frac{84 + 21}{2}$$

$$\text{Mi} = \frac{105}{2}$$

$$\text{Mi} = 52{,}5$$

e) Calculating Standard Deviation (SDi)

The Ideal Standard Deviation (SDi) is calculated using:

$$\text{SDi} = \frac{1}{3}\ \text{Mi}$$

$$\text{SDi} = \frac{1}{3}\ (52.5)$$

$$\text{SDi} = 17.5$$

f) Determining the Qualification Interval

The upper boundary for the Excellent category is calculated as:

$$\text{Mi} + 1.5\text{SDi}$$

$$= 52.5 + (1.5 \text{ x } 17.5)$$

$$= 52.5 + 26{,}25$$

$$= 78{,}75$$

Table 22. Reading Behavioural Engagement Rating score

Value interval	General criteria
X ≥ 78.75	Excellent
61.25 ≤ X < 78.75	Good
43.75 ≤X < 61.25	Average
26.25 ≤X < 43.75	Below average
X < 26.25	Poor

Since the obtained score of 77.00 was slightly lower than 78.75, the digital storybook was categorized as good in facilitating students' reading

behavioural engagement. Although categorized as Good, the score is very close to Excellent. This shows that the digital storybook helps students stay focused and participated actively while reading. This result also supported by the documentation during the trial session. The observations indicate that several dimensions of reading behavioural engagement were demonstrated by the students while reading the digital storybook including effort, persistence, attention, positive conduct, active participation, reading frequency, and interaction with the texts. The following figures present the documentation that illustrates these dimensions during the reading activity.

Figure 59, shows that most of the students raised their hands when they were asked who was interested and willing to read the story. This behavior represents the dimensions of active participation and positive conduct of reading behavioural engagement, as the students showed enthusiasm and willingness to be involved in the reading activity.

Figure 59. Students raised their hand

Moreover, Figure 59 shows that some students voluntarily want to read the digital storybook story for their friends by raising their hand. This behavior reflects the dimension of effort in reading behavioural

engagement, as the students actively participated and willing to try read in for their friends.

Figure 60. Students Want to Read the Story

In addition, Figure 60 shows several students try the clickable features available in the digital storybook. This behavior indicates the dimension of interaction with texts, as the students explored the features provided in the digital storybook.

Figure 61. Students Interaction with the Digital Storybook

Finally Figure 61 shows that students reading the digital storybook until the end of the story and try to answering the quiz. This behavior represents the dimension of reading frequency of reading behavioural engagement, as students complete the reading activity until the end of the story.

Figure 62. Students Read the story until the end

In conclusion, the findings indicated that the developed digital storybook has potential to support students reading behavioural engagement. Therefore, the digital storybook can be considered in facilitating students reading behavioural engagement during reading activity.

4.2 Discussion

This study was conducted to identify the needs of fifth-grade students and their teacher regarding reading media that integrate SDG-2 (Zero Hunger) to support reading behavioural engagement. Furthermore, the study aimed to design, develop, and evaluate a digital storybook based on the identified needs. The findings indicate that both students and the teacher require reading media that are simple, visually appealing, interactive, and relevant to students' everyday experiences. They also emphasized the need for materials that provide clear instructional support, facilitate comprehension, and incorporate digital features capable of sustaining students' attention and active participation throughout reading activities.

These findings are consistent with previous research emphasizing the importance of well-designed reading media in promoting student engagement during literacy learning. According to Fredricks et al. (2004), Guthrie (2004), and Nguyen et al. (2016) behavioural engagement is demonstrated through observable behaviours such as active participation, sustained effort, attention, and task completion. The present study found that students exhibited lower levels of engagement when using textbook-based reading materials, suggesting that traditional resources may be less effective in encouraging active involvement in reading activities. This finding supports the argument of Oliveira & Lathrop, (2018), who noted that unengaging reading materials can contribute to student disengagement during literacy instruction. In addition, studies conducted Hidayat et al. (2024) and Vackova et al. (2023) reported that multimedia-enhanced reading environments and visually enriched digital storybooks can positively influence students' attention, comprehension, and overall engagement in reading.

The findings also indicate that students preferred shorter reading texts supported by illustrations, as longer text-heavy materials reduced their attention and willingness to participate. This finding supports previous studies which suggest that visual support plays an important role in sustaining students' focus and understanding. Asilestari et al. (2025) emphasize that visual elements significantly improve students' concentration during reading activities, while Istihari (2024) explains that reading materials for young learners should be adjusted to their developmental level through simple language and accessible presentation. In addition, the teacher's perspective further confirms that

instructional guidance and simplified content are necessary to help students remain engaged throughout the reading process.

Despite this alignment, a different pattern appears when the findings are compared with some previous studies. While Riansih et al. (2025) suggest that textbooks can still be effective when supported by appropriate instructional strategies, the present study indicates that textbook-based reading materials alone were insufficient in maintaining students' behavioural engagement in this particular context. This suggests that the effectiveness of reading media depends not only on the instructional strategy, but also on the extent to which the materials themselves align with students' needs and classroom characteristics.

Another important finding from the needs analysis is that contextual relevance plays a significant role in sustaining students' engagement. Students demonstrated stronger participation when the reading materials reflected familiar situations related to food. These findings are consistent with previous studies which highlight that contextual learning materials help students connect academic content with real-life experiences. (Sheridan & Tanaka, 2024, 2025) emphasize that SDGs-based educational materials become more meaningful when learners can relate the content to their everyday lives. Similarly, UNESCO (2017) explains that education for sustainable development, particularly SDG-2, should encourage awareness and behavioural change through meaningful and relatable contexts.

However, a different perspective can be seen in some previous studies. Sambayon et al. (2023) suggest that abstract global issues may also be introduced effectively through guided instruction. Nevertheless, the findings of

this study indicate that for elementary students, familiar and concrete contexts appear to be more effective in supporting engagement and comprehension. This may be influenced by students' developmental characteristics, where younger learners tend to engage more actively with content that reflects situations they can easily recognize and understand.

Taken together, an important insight from this stage is that appropriate reading media should not only be visually attractive and interactive, but also developmentally appropriate, contextually relevant, and supported by clear instructional guidance. Moreover, the integration of SDG-2 should be presented through familiar and meaningful contexts to ensure that sustainability concepts remain understandable and engaging for elementary students.

To address the identified needs, the study proceeded to the design and development of an SDG-2 digital storybook using the ADDE model. The design stage focused on determining the storyline, theme, number of pages, language level, illustrations, and digital features based on students' and teacher's expectations. The findings indicate that students preferred digital storybooks characterized by colorful illustrations, concise text consisting of short sentences, and interactive features that could assist their understanding during reading. The teacher also emphasized the importance of including guidance, simple instructions, and supportive digital elements to encourage active participation.

Consistent with these development outcomes, the findings align with previous studies which emphasize that well-designed digital reading materials supported by visual and interactive features can enhance students' engagement.

Son & Butcher (2024) explain that digital storybooks should integrate multimedia elements to improve learners' comprehension and engagement. Similarly, Fitria & Afdaleni (2025) highlight that concise text and visual support can reduce cognitive load, making reading materials more accessible for young learners. The inclusion of interactive features such as pop-up translations and quizzes also supports previous findings suggesting that guided interactivity can strengthen students' comprehension and participation during reading activities (Azizah & Wulandari, 2026). Previous studies by Kustyamegasari et al. (2025) indicate that children storybook commonly consist of 32 pages, meanwhile the findings of this study indicates that both students and teacher need shorter reading media, approximately 14 pages with minimal text. This difference influenced by students' attention span, classroom conditions and the pattern to lose focus when reading longer story.

However, a different focus can be observed compared to some previous studies. While earlier research often emphasizes the effectiveness of digital storybooks as final products, this study highlights the importance of aligning the design process closely with identified learners' needs. The selection of short texts, visually dominant pages, contextual SDG-2 content, and supportive interactive features was not merely based on general assumptions about digital learning, but was specifically informed by students' and teacher's identified needs. This suggests that effective digital storybook development requires more than simply integrating digital features; it requires purposeful alignment between learners' needs and instructional design decisions.

During the development phase, the digital storybook was transformed from a conceptual design into a functional learning product through a structured and systematic process. This process involved illustration development, digital integration, feature implementation, and online publication to ensure accessibility for students. The illustrations were designed to remain visually consistent, child-friendly, and supportive of the narrative content. Meanwhile, digital features such as clickable buttons, pop-up vocabulary support, and comprehension activities were integrated to enhance students' engagement during reading.

These findings are consistent with previous studies highlighting the importance of systematic development processes in creating digital educational materials. Saborío-taylor (2025) emphasize that effective digital learning materials require careful integration between instructional design, multimedia features, and learner accessibility. Similarly (Song & Kim, 2020) highlights that interactive scaffolding can improve students' participation and comprehension when implemented appropriately.

Despite this alignment, previous studies argue that overly complex digital tools may create usability challenges and distract younger learners (Siska et al., 2025). However, the findings of this study suggest that when the development process is conducted systematically and guided by learners' needs, digital interactivity can remain supportive rather than distracting. This indicates that the effectiveness of digital features depends not only on the type of feature used, but also on how carefully they are integrated into the learning design.

After the development process, it was essential to evaluate whether the product met the expected quality standards. The expert evaluation results indicate that the developed digital storybook achieved an Excellent category, suggesting that the product fulfilled important quality criteria for educational digital storybooks. These findings are consistent with previous studies which emphasize that good digital storybooks should be purposeful, interactive, accessible, child-friendly, and capable of maintaining learners' engagement (Vackova et al., 2023). The developed product fulfilled these characteristics through its structured storyline, age-appropriate language, contextual SDG-2 integration, and supportive digital features.

In terms of SDG integration, the findings also support previous studies which emphasize that sustainability education should remain meaningful and relevant to learners' contexts. (Siska et al., 2025) explain that SDGs-based educational materials can effectively promote awareness when sustainability concepts are presented appropriately for learners' developmental levels. The integration of Zero Hunger in the storybook helped ensure that SDG-2 remained accessible and understandable for elementary students. These findings suggest that meaningful integration between sustainability content and instructional design plays an important role in creating effective educational materials.

While expert validation confirms the product quality, it is equally important to examine how the digital storybook performs in actual classroom implementation. The teacher evaluation results indicate that the digital storybook effectively facilitated students' reading behavioural engagement, as reflected in students' attention, participation, effort, and interaction with the

digital features during the trial session. These findings are consistent with previous studies which define behavioural engagement as observable actions including active participation, persistence, and sustained attention during learning activities (Fredricks et al., 2004; Guthrie, 2004; McGeown & Smith, 2024).

At the same time, a difference can be seen between this study and some previous research. While earlier studies often rely primarily on students' responses regarding enjoyment or motivation, this study evaluates engagement through teacher assessment supported by classroom observation during implementation. This provides a more practical perspective on how behavioural engagement appears through students' observable actions rather than relying solely on self-reported perceptions. In addition, the findings demonstrate how contextual content, structured instructional design, visual support, and digital interactivity work together to facilitate reading behavioural engagement.

One challenge encountered during the development process was determining an SDG-2 theme that was both educationally meaningful and developmentally appropriate for fifth-grade students. Initial considerations included topics related to agriculture and food security, as these concepts are closely associated with the objectives of SDG-2. However, the needs analysis revealed that students had limited prior knowledge of these topics and experienced difficulty relating them to their daily lives. Consequently, the researcher adapted the content by selecting the theme of food sharing, which represents a more familiar and accessible aspect of Zero Hunger. This decision was supported by students' familiarity with food-related vocabulary and their

ability to connect the concept of sharing food with everyday experiences. The adaptation highlights the importance of balancing curriculum objectives with learners' developmental characteristics and existing knowledge when designing educational materials for young learners.

Another challenge concerned the narrative structure of the digital storybook. During implementation, it was observed that several students were able to predict the storyline and ending of the story at an early stage. Although a simple and straightforward narrative was intentionally selected to ensure comprehension, this predictability may have reduced opportunities to sustain curiosity and anticipation throughout the reading process. Ideally, the storyline could have been developed with more complex plot elements, unexpected events, or less predictable endings while still remaining appropriate for elementary learners. This experience implies that future development of digital storybooks should involve a more in-depth examination of various children's storybooks and narrative structures before the design process begins. A stronger understanding of storytelling techniques may support the creation of narratives that are both comprehensible and engaging, thereby maintaining students' interest and participation throughout the reading experience.

However, this study was conducted through a limited classroom trial involving a specific group of fifth-grade students, which means the findings may not fully represent broader elementary learning contexts. Students' engagement may vary across different classroom environments, school settings, and learner characteristics. Therefore, the effectiveness of the developed digital storybook should be interpreted within the context of this implementation.

In addition, this study specifically focuses on reading behavioural engagement, particularly observable dimensions such as participation, attention, effort, and interaction. Other dimensions of engagement, such as emotional engagement and cognitive engagement, were not examined in this study. Therefore, the findings provide only a partial understanding of students' overall reading engagement.

One limitation of this study concerns the data collection process involving the students. The student interview was not conducted using a formal interview protocol; instead, it was carried out through informal question-and-answer sessions during classroom activities. This approach was considered appropriate for maintaining students' comfort and encouraging natural responses in the elementary school context. However, the absence of a structured interview protocol may have limited the depth, consistency, and richness of the data obtained from the students. Therefore, future researchers are encouraged to incorporate formal or semi-structured interviews with students to obtain more comprehensive insights into their perceptions, experiences, and responses toward the developed digital storybook.

Another limitation lies in the evaluation process, which relied primarily on teacher assessment supported by classroom observation. Although this approach provides practical insights into students' observable behaviours, the interpretation may still involve subjective judgment. Additional evaluation methods, such as student self-reports or repeated classroom observations, may provide a more comprehensive understanding of engagement. Furthermore, since the developed product is web-based, its implementation depends on the

availability of digital devices and stable internet access. This may limit its applicability in educational settings with restricted technological infrastructure.

Overall, the findings indicate that students' reading behavioural engagement can be facilitated through carefully designed digital reading media that combine contextual relevance, visual attractiveness, structured guidance, and meaningful interactivity. Therefore, this study highlights the importance of a systematic process beginning from needs analysis, continuing through design and development, and ending with expert validation and classroom implementation. This process demonstrates how an SDG-2-integrated digital storybook can effectively support elementary students' reading behavioural engagement in a meaningful and engaging way.

4.3 Implication

4.3.1 Theoretical Implication

This study contributes to the theoretical understanding of digital learning media in English language teaching, particularly in the context of elementary reading instruction. The findings support the idea that integrating interactive digital storybooks with visually engaging features, clear guidance, and contextually meaningful content can facilitate students' behavioural engagement in reading activities. Additionally, the incorporation of SDG-2 themes demonstrates how language learning media can be aligned with sustainability education, extending the discussion on integrating global educational values into English language teaching for young learners.

4.3.2 Practical Implication

Practically, this study provides a digital storybook that can be used as a supplementary reading medium for fifth-grade elementary students, particularly in English learning contexts similar to SD Mutiara. Through visual support, interactive features, and age-appropriate content, the product may help teachers facilitate students' behavioural engagement during reading activities. Rather than replacing textbooks, the digital storybook serves as an additional instructional resource that makes reading more engaging and accessible for young learners. The findings also suggest that the integration of Sustainable Development Goals (SDGs) into elementary learning materials should consider learners' prior knowledge and developmental readiness. Since broad SDG-2 concepts such as agriculture and food security may be difficult for younger learners to understand, educators and material developers are encouraged to contextualize sustainability themes through familiar topics and everyday experiences. In this study, the theme of food sharing was selected because it was closely related to students' daily lives and vocabulary knowledge, enabling sustainability concepts to be introduced in a more meaningful and accessible manner. Therefore, this study may serve as a practical reference for teachers and material developers in designing contextualized digital learning materials that align sustainability education with students' characteristics and learning needs.

4.3.3 Policy Implications

This study suggests that schools and educational institutions may consider integrating digital learning materials that combine language

instruction with sustainability-related themes, such as the Sustainable Development Goals (SDGs), into elementary education. The findings indicate the potential value of supporting digital literacy initiatives through curriculum enrichment and providing access to interactive educational resources. Educational stakeholders may also consider encouraging the development and implementation of contextually relevant digital materials to support more engaging and meaningful English learning experiences.

4.3.4 Methodological Implications

Methodologically, this study demonstrates the application of the Design and Development (D&D) approach using the ADDE model in developing digital instructional media for elementary English learning. The findings suggest that the ADDE model provides a systematic framework for creating educational products aligned with learners' needs, classroom contexts, and curriculum objectives. Through needs analysis, product design, development, and evaluation, this study offers a practical reference for future researchers developing technology-based learning media. Furthermore, the development process highlights the importance of narrative design in educational storybooks. Although the storyline was intentionally simplified to support comprehension, classroom implementation revealed that some students could easily predict the plot and ending. This suggests that future developers should conduct a more thorough analysis of children's literature and storytelling techniques during the design phase. Greater attention to plot complexity, suspense, and narrative structure may help create digital storybooks that not only support

comprehension but also sustain learners' curiosity and engagement throughout the reading process.

CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1 Summary

This study applied the Design and Development (D&D) model consisting of four stages namely analysis, design, development and evaluation. The development of the digital storybook was based on the needs identified from grade fifth students and teachers, particularly the need for digital reading media that provide clear guidance, clickable features, visual support and real-life content that are meaningful. These elements were integrated into the digital storybook to facilitate students reading behavioural engagement during reading activities.

The evaluation of the developed product was conducted through expert judgement using a checklist completed by two experts and one teacher. The results indicate that the digital storybook achieved Excellent criteria in terms of digital storybook quality and alignment with the selected SDG-2 learning objectives. Both experts agreed that the product met the expected standards. In addition, the teacher's evaluation also showed good criteria in supporting students' behavioural engagement. Therefore, the developed digital storybook is considered appropriate to be used as a supporting reading media in the classroom.

5.2 Conclusion

From the result of the study, several conclusions can be drawn:

1. Need Analysis: The results revealed that both students and teachers require reading media that are engaging as well as educational. Students preferred content supported by attractive visuals and simple language, whereas teachers emphasized the need for instructional media equipped with clear directions and interactive features that could sustain students' attention during learning activities..
2. Product Development: The interactive digital storybook was successfully created by incorporating various multimedia resources and clickable components. The product was designed with an emphasis on accessibility, ease of use, and interactivity, enabling students to become actively involved in the reading process rather than merely receiving information passively.
3. Product Quality: The digital storybook obtained an Excellent rating based on expert evaluations. The validation results indicated that the product met pedagogical standards and was technically suitable for use by elementary school students.
4. Behavioural Engagement: The teacher's assessment and classroom observations demonstrated that the digital storybook achieved a good level in promoting students' reading behavioural engagement. During the implementation, students exhibited all major indicators of engagement, including sustained effort, persistence, attentiveness, appropriate behaviour, and active involvement throughout the reading activities.

In conclusion, the implementation of the interactive digital storybook has potential in supporting students' reading behaviour. Rather than remaining passive participants, students showed active in attention, persistence, and active participation during one formative trial . Therefore, this interactive digital storybook can be considered an innovative educational medium that supports student-centered learning and encourages greater enthusiasm for digital literacy exploration.

5.3 Suggestions

Based on the findings and conclusions of this study, several recommendations are offered for English teachers, schools, future researchers, and educational media developers to further improve the implementation and quality of digital-based English learning

1. For English Teachers

   English teachers are encouraged to incorporate interactive digital media into reading instruction to create a more engaging learning experience and minimize students' boredom during classroom activities. In addition, teachers should serve as facilitators by providing guidance and support while students interact with the digital storybook, ensuring that they remain focused on the learning objectives and storyline.

2. For Schools

   Schools are advised to support the integration of digital learning by providing adequate Information and Communication Technology (ICT) facilities and infrastructure. Moreover, schools should organize professional development programs, such as workshops and training

sessions, to enhance teachers' skills in utilizing innovative digital learning media. Such support can contribute to the development of a technology-enhanced learning environment that promotes students' motivation and digital literacy skills.

3. For Future Researchers

   As this study primarily examined students' behavioural engagement, future studies are recommended to investigate the influence of interactive digital storybooks on other dimensions of engagement, including emotional and cognitive engagement. Further research may also examine the effectiveness of this type of media across different educational levels, learning contexts, or a broader range of story genres.

4. For Learning Media Developers

   Learning media developers are encouraged to continuously improve and expand the interactive features of digital storybooks. The inclusion of additional elements, such as gamification, voice-recording functions, or other personalized learning tools, may further enhance students' engagement and provide a richer and more individualized reading experience.

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