

Article

Screens with Stories: Productive Digital Reading for Children?

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Abstract

With support from European funding, a digital picture book library was developed to assist families with limited access to age-appropriate books in a familiar language. This study examines how a multilingual group of families engaged with the library. Specifically, it investigates the frequency of visits, the range of titles accessed, the extent of rereading, the navigational strategies used to support comprehension, and the languages chosen during reading. Log data were collected over approximately four months in two kindergarten groups (28 users) and one childcare center serving 3-year-old children (48 users). About one-third of participants read at least one complete book, although most did so only once or a few times. Among families who used the library more consistently, all titles were accessed, and many were reread. Some users showed remarkable navigation patterns: they repeatedly revisited early scenes, suggesting a self-guided strategy for building familiarity before progressing through the story. Despite the multilingual backgrounds of the families, books were read predominantly in the societal language. Overall, the findings suggest that the digital library is appealing to families and, when implemented on a broader scale, has the potential to support the language development of a substantial number of children.

Keywords: digital library; multilingualism; digital picture books; multimedia-enhanced; book reading; multilingual families; children aged 3–5



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1. Introduction

Technoscience constitutes an integral dimension of the contemporary world, being ubiquitous in all settings and aspects of everyday life. Learning and education are no exception, and in recent decades digital technologies have become part of education in both formal and informal contexts. Even very young children are nowadays exposed to digital technologies, despite paediatricians' warnings against starting too early or spending too much time on them each day (AAP Council on Communications and Media, 2016). However, since digital devices are ubiquitous and young children observe their parents using them intensively, they are naturally curious and eager to imitate this behaviour and play with these devices (Bibera et al., 2024). In addition, parents sometimes use digital media for their children at moments that suit them, such as while cooking or when a child is restless (Mediawijshheid, 2025). Therefore, rather than merely insisting that children spend as little time as possible on devices, it seems more logical to focus on designing content that can be beneficial (Tatar & Gerde, 2022).

Even though strong evidence for a positive relationship between the digital home environment and language or literacy outcomes is missing (e.g., [Segers & Kleemans, 2020](#)), we hypothesize that digital activities can offer a breakthrough for groups in which, for various reasons, literacy receives less attention in the home environment ([Selçuk et al., 2023](#)). This study explores whether a digital library with picture books may help remove significant barriers for book reading.

1.1. Accessible, Home-Language Picture Books

To families who cannot afford to buy books or who do not have access to libraries, free digital libraries can provide an adequate solution. In digital format, picture books can be made easily accessible in locations where books are lacking. For instance, experiences in Kenya with the BookSmart app—which offers access to a digital library for children, including picture books—support this idea: most families had devices that enabled them to access the books, which in turn led to increased time spent reading at home ([Nicolai et al., 2023](#)). A key condition, of course, is that the library is free of charge and accessible on all types of devices.

Furthermore, it is easier to make digital books available in a familiar language than print books. Print books are typically available only in the societal language, depriving a growing group of young children of opportunities to hear stories in their home language ([Cun, 2022](#)). Digital books, however, can be easily made available in multiple languages, enabling minority-language families to read in their first language—a practice associated with various benefits, such as increased interaction while reading when sharing a book in their home language ([Reinoso et al., 2025](#)). Reading stories in the mother tongue not only increases the pleasure of reading but also provides an important incentive for language development. It supports learning the mother tongue and also facilitates the acquisition of the societal language ([Eisenworth et al., 2018](#); [Daly, 2021](#); [Luo & Song, 2022](#); [Pico & Woods, 2022](#); [Shen & Del Tufo, 2022](#)). This can be explained by the fact that exposure to complex vocabulary in literary works in the heritage language enables children to recognize and understand the same words when they encounter them in the societal language ([Cummins, 2000](#)).

1.2. Lower Reliance on Parental Support

Another advantage of digital books is that they can be structured in ways that make reading sessions less dependent on parental guidance and its quality, due to three features present in the digital library used in our experiment: voice-overs, multimedia enhancements, and interactivity. Picture books with voice-over functionality—where the text is not only present in print but also read aloud—can be experienced without an adult reading to the child ([Barnes et al., 2022](#)). However, the voice-over must be engaging to be effective ([Davison et al., 2025](#)). Not every reader is a voice actor; therefore, incorporating voice-over functionality in digital books requires specific expertise in digital picture-book production.

Multimedia elements—such as animation, sound, and camera movement through illustrations—can guide children’s attention, highlight pivotal aspects of the storyline, and support them in making necessary inferences, all much like a human guide. When adding multimedia, the primary focus should be on leveraging technology to address challenges that might impede the cognitive processing of stories ([Mayer, 2014](#)). This includes, for instance, supporting children in selecting and organizing the visual elements that are essential for comprehending the story ([Flack & Horst, 2017](#)). Illustrations often contain many details, and children can benefit from a camera that moves through the illustration, bringing the relevant elements to the foreground amid all the visual information ([Bus et al., 2024](#)).

Furthermore, as [Mayer \(2014\)](#) concludes for many types of tasks, learners often adopt a superficial approach and do not fully utilize their cognitive capacity to integrate all available

information. Similar findings apply to story comprehension: many young children need to be motivated to exert effort to make sense of the information and require support in doing so (Bus et al., 2024). Multimedia theory describes ways to ignite children's curiosity and prompt them to actively seek explanations for events in a narrative.

Finally, digital books can be made interactive, enabling children to explore the stories in new ways: scenes do not appear automatically but must be activated by the user, who can not only take more time but also choose to move forward or backward. This interactivity, as implemented in the digital library used in this study, fosters greater autonomy in engaging with the story and allows readers to control the pacing of the reading experience (Bus & Anstadt, 2021), as well as to return to pages and reread them.

1.3. The Current Study

Book reading is a key environmental factor in young children's emerging language skills, exposing them to richer and more complex language than caregiver-child conversations (Dickinson & Morse, 2019). However, establishing book-reading routines is challenging in many families (Justice et al., 2015). Even after intensive coaching—resulting in small to moderate gains in language and literacy—book reading often does not become a sustainable family routine, and consequently, neither do its effects (Landry et al., 2017).

This study explores whether a digital library of picture books can serve as an incentive for multilingual families who lack access to books in their home language and do not have established book-reading routines. The ten books, created with support from an Erasmus+ grant for the *Stimulating Adventures for Young Children* (SAYL) project, were made freely available and accessible on all types of devices. Offered in multiple languages (including Arabic, Tamazight, Polish, Ukrainian, and Turkish), the books enable minority-language families in the Netherlands to read stories in their first language. Additionally, multimedia features and voice-overs make reading less dependent on adult guidance.

The SAYL book library differs from the numerous, often open-access, picture book libraries available worldwide (e.g., BookSmart, WorldStories, African Storybook, Global Storybooks, Bloom Library, MagicBlox, and Stories with Clever Hedgehog). For the youngest children, most libraries primarily offer concept books about colours and numbers or thematic books featuring farm animals, the jungle, or weather phenomena. However, appropriate children's books not only provide a rich context for language acquisition—"children's books are where the words are" (Stahl, 2005, p. 100)—but also support knowledge building about a wide range of events and situations. To achieve this, it is important that the books' contents are engaging, as only stories that present an appealing problem and its resolution can truly do so. The SAYL project therefore focused on stories with plots and themes that are appealing to young children, such as friendship—real or imaginary—puzzle solving, play, and animals.

In implementing the digital picture book library in the target households without prescribing its use (Iddings, 2009), we aimed to gain a deeper understanding of these households as places rich in knowledge and experiences that foster and support the literacy development of young children—contrary to the common misconception that immigrant homes are environments from which children need to be rescued. This article explores how multilingual, low-educated parents, given free access for four months without further instructions, used the digital picture books. All families receiving access had children aged three to six. Usage was tracked through log data to assess patterns of engagement, including the frequency and repetition of book reading.

Based on the log data, the study addressed the following research questions:

1. *Extent of use:* Among users who successfully accessed the library (thus demonstrating initial interest), what proportion went on to make substantial use of it by reading one or more books in full?
2. *Reading patterns:* Among users who read books in full, does reading remain occasional, limited to one or two instances, or do regular or repeated reading routines develop (for example, reading one book per day)? Are other temporal patterns observable?
3. *Reading behaviour:* How do frequent visitors familiarize themselves with the story content? Do they typically read books straight through from beginning to end, or do they engage with the stories in other ways?
4. *Language use:* Among users from multilingual families, to what extent are languages other than Dutch (the ambient language) used?

2. Materials and Methods

2.1. Design

Two groups of multilingual parents were given access to the digital library. One group consisted of families with kindergarten-aged children (4–5 years), and the other of families with preschool-aged children (3 years). To ensure that the log data could be distinguished by age group, each group received a unique link to the library. Because families within each site used the same link, it was not possible to associate usage data with personal characteristics such as children's sex or home language. This approach was intentionally chosen, as we expected that linking usage data to personal information might discourage participation. Log data were collected over a four-month period.

2.2. Participants

Multilingual families with kindergarten-aged children (4–5 years) were recruited through two schools in a large city in the western part of the Netherlands, and multilingual families with preschool-aged children (3 years) were recruited through a childcare center with multiple locations in a medium-sized city in the central Netherlands. All sites included a high proportion of multilingual families whose home languages—mainly Turkish, Tamazight, or Arabic—were among the languages available in the SAYL books.

Staff at the schools and childcare center invited multilingual parents to attend an information meeting about the SAYL books and use the books at home. Approximately 50 parents of kindergarten-aged children and 30 parents of preschool-aged children came to the meetings. Based on the researchers' impressions during the meetings, it was estimated that about 30% of these parents speak only their home language well and not Dutch, the societal language, and that some have limited literacy skills.

2.3. Digital Picture Book Library

The ten SAYL books—of which only nine were available during the study—each contain a literary story with themes appropriate for young children. The characters are developed in such a way that they feel alive, allowing readers to understand how they respond, behave, and change throughout the story. The narratives create surprise and tension through problems and the successive attempts to resolve them. Moreover, most books incorporate humour (e.g., a centipede searching for its boots, which have been repurposed by other animals into a cup, a boat, or a pencil holder; or a girl lamenting her baby brother's noises and messy habits) and irony (e.g., a bird complaining that its nest is unsafe because it is high up in a tree). The language is intentionally rich, featuring sophisticated words such as *pretend*, *raft*, *spaceship*, *shooting stars*, and *snap in two*, as well as complex sentence structures like "I can take on any beast" or "Thabo pretends the playground is a jungle."

The SAYL books are compatible with a wide range of devices, including smartphones, tablets, and desktop or laptop computers, regardless of brand or operating system. After logging into the digital library, users see an overview of all nine titles, each presented with an image and printed title, and can start reading by clicking *Start Book*. Upon opening a book, a screen displays the flags of the available languages, with each language name shown below its corresponding flag, allowing users to select their preferred language.

The library offers both European and immigrant languages, including Arabic, Dutch, English, German, Maltese, Norwegian, Polish, Tamazight, Turkish, and Ukrainian. Each book is available not only in written form but also with voice-over narration in all languages, which users can choose to activate or deactivate.

2.4. An Example of a Multimedia Enhancement

The books include multimedia, for instance to help them select vital visual elements. Children can easily miss important information in picture books, for instance because many details are visible at the same time (Bus et al., 2024). Zooming in on specific parts of an illustration can help them focus on what is most relevant. In the spread shown on the left side of Figure 1, children typically notice the beast in the corner first. However, by first zooming in on the girl's face (see the screenshot on the right side of the figure) and revealing the beast only in a subsequent zoom, the design helps children attend to the girl's emotions—such as fear or uncertainty—without being distracted by the beast. These emotional cues are important for understanding what will happen next.



Figure 1. Screenshots from “Unathi and the Dirty Smelly Beast”. *Note.* This book, created by Jesse Jardim-Wedepohl, Jon Keevy, and Thokozani Mkhize, was produced for *Book Dash* and is licensed under a Creative Commons license (Jardim-Wedepohl et al., 2016). The zoom-ins and other animations were developed by *Het Woeste Woud* (Van Wyk & Mathieson, 2016).

2.5. Log Data

To gain insight into the usage of the digital picture book library, we collected log data. Parents were provided with access to the library through a link connected to the data collection system. Parents from the same classroom or group received the same link, thereby ensuring that the information collected remained anonymous. However, different links were assigned to schools and childcare centers to enable us to distinguish usage patterns by age group. Based on the log data infrastructure developed by the third author, we were able to determine:

- The dates and times at which the library was accessed on a given device.
- Which titles were opened during each visit.
- Whether books were merely opened, read partially, or read in full, and, in the case of partial or full readings, which scenes were viewed.
- The sequence in which the scenes of each book—typically consisting of 9 to 15 scenes—were viewed.

- Which language was selected and whether language preferences changed during a visit or over time.

2.6. Procedure

Teachers invited multilingual parents to an information session at the school or child-care center, held after drop-off in the morning. During this session, the researchers (first and second author) introduced the SAYL library, demonstrated the books, and explained their potential value for children's language development. The availability of ten language options and the importance of reading in the mother tongue were emphasized. In total, about 30 parents attended the meetings at the child centers and about 60 attended the meetings at the kindergartens. As an estimated 30% of the parents had limited proficiency in Dutch, the societal language in which the information was provided, they were supported by other parents who shared their home language and were more proficient in Dutch. At the end of the session, parents were given access to the digital library and shown how to save the link on their devices.

After two months, the schools and centers organized another meeting with parents to gather feedback on the quality and usefulness of the library. The number of attendees was smaller than at the introductory sessions. Moreover, many of the parents who attended were new and had not yet begun using the library, resulting in a session that combined an introduction to the books with the collection of comments from those who had already used them.

The sessions were not transcribed or systematically analyzed. However, they left the researchers with the impression that the books were well received by the parents. Parents responded enthusiastically to the music and animation and confirmed that the language and pronunciation were accurate. In the follow-up sessions, some parents explained that they had not accessed the library due to technical issues, such as incomplete depictions on their devices or difficulties using the URL. A few parents who seemed unfamiliar with the practice of book reading had not used the books because they were unsure what to do after opening them.

At their first login via the provided link, parents were asked to consent to the automatic tracking of digital library usage. This request was not repeated for subsequent logins on the same device, but it was presented again whenever a different device was used to access the books.

2.7. Statistical Analyses

The raw data were processed by the fourth author into an Excel file suitable for analysis. The first author analyzed the data, which consisted of a long list of entries specifying the date, book title, the scene to which each entry pertained, the language chosen for that entry, and other details. Using the RStudio (R 4.5.1) packages **dplyr**, **ggplot2**, **lubridate**, **stringr**, **tidyr**, and **tidyverse**, descriptive analyses were performed.

First, the number of incidental and frequent users in the log data was determined using a syntax that coded each book as **just opened** (not going beyond scene 0), **partly read** (reading at least scene 1 but never beyond scene 7), or **completely read** (going beyond scene 7). Based on these coding, we created a figure showing the number of non-readers, incidental readers, and frequent readers, separately for kindergarten- and preschool-age children.

Combining these coding with the date, book title, and language preference, we generated figures for typical frequent readers, illustrating how often titles were read completely or partly, which titles were chosen, and on which dates. To illustrate reading habits, we created figures showing how users who explored particular books for longer periods progressed through them. Finally, regarding language, we compared the preferred language

for partially and completely read books in the preschool and kindergarten groups using chi-square or Fisher's exact tests.

2.8. Ethical Considerations

The study was approved by the Data Protection Services (SIKT) at the request of the University of Stavanger, where the SAYL project is hosted (reference number: 522270). Written informed consent was obtained from all participants, and all data collection procedures adhered to ethical guidelines to ensure anonymity and confidentiality.

3. Results

For the preschool group, the study covered the period from May 16 to the end of September. Activity was highest in May (410 log entries), followed by June (379) and July (227). Thereafter, activity declined completely, even though the library remained accessible. A total of 48 different users appeared in the preschool log data, which is higher than the number of parents (approximately 30) with whom we had direct contact during meetings organized at the centers.

The period of data collection for the kindergarten group covered the same timeframe, from mid-May to the end of September. Log entries in May, June, July, and August were 122, 291, 286, and 295, respectively. After that, activity declined, with only a few entries recorded in September. In the log data, 28 different users appeared, representing about half of the 60 parents with whom we had direct contact during sessions at the schools.

3.1. Extent of Use

The results of the coding of library visits are shown in Figure 2. The system was programmed to classify users into three categories:

1. *Opening only*: Users who opened one or more books but did not read any book in full, typically viewing only a few pages.
2. *Occasional full readings*: Users who not only opened books or read them partially but also read one or two books in full, though only occasionally (typically within one or two visits).
3. *Regular or sustained reading*: Users who read multiple books in full over a longer period.

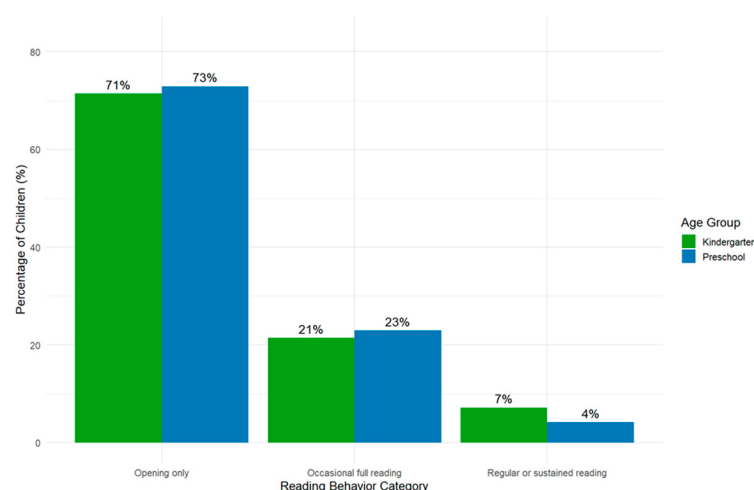


Figure 2. Reading Engagement Patterns in the SAYL Digital Library.

We defined *partially read books* as those in which the user did not progress beyond scene 7 (most often only reaching scenes 2 or 3) and *fully read books* as those in which the user reached scene 8 or beyond.

More than 70% fell into the first category—occasional visitors, who opened one or more books and at most read a few pages. Slightly less than 30% of all visitors read one or more books in full. A small percentage reached level 3—7% of the kindergarten group and 4% of the preschool group—developing a habit of regular or sustained reading and engaging with a series of books, spending substantial time on SAYL books. For instance, one user read 8 books across 12 visits over 26 days, totaling 72 min. Another frequent user read five books in five visits over the same period, totaling 88 min.

3.2. Reading Patterns

In cases where visitors were regular or sustained users of the library, we examined whether they engaged with all available books to the same extent, whether they reread books, and, if so, how often. Two users read the maximum number of books (eight) during the recorded period, while two others read five books. Although nine books were available in total, the maximum observable number was eight due to a registration error affecting one title.

Figure 3 illustrates the reading routine of a preschool user over a six-week period. During this time, the user engaged in approximately 12 visits, averaging about twice per week. Reading activity was fairly evenly distributed across the period. Four of the eight books were reread once or twice. “Shongololo’s Shoes” was initially only partially read, with several attempts in which the opening scenes were repeatedly revisited. Following this first attempt, two sessions were dedicated to reading “Shongololo’s Shoes” in full (L’Ange et al., 2016). “Homer”, by contrast, was never completed during the two sessions in which it was attempted (Klompemaker & Broekhof, 2024). “The Best Nest” was partially read twice but never finished (Vermaak et al., 2021). It remains unclear why, after the last session in the third week of July, the library was no longer visited, even though books were still available.

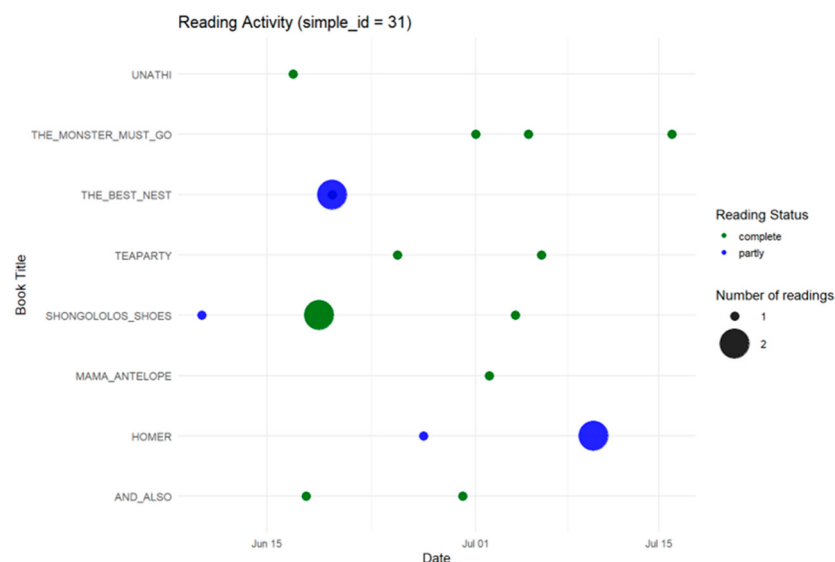


Figure 3. Books read in full or partly by a preschooler.

Another user who read all eight books was a child of kindergarten age. The example in Figure 4 illustrates a dense series of visits over a 14-week period. For this user, activity was visible throughout the entire period for which registrations were made. During the 14 weeks, all registered books were read and each was repeated at least once after an initial reading. Six books were frequently repeated, with repetitions reaching up to nine times (“Unathi”). In total, there were 19 visits, meaning reading occurred on average three times every two weeks. In the initial period, the child read one to two books per visit, but in

the last five visits, after becoming familiar with the books, the user read up to six books per visit.

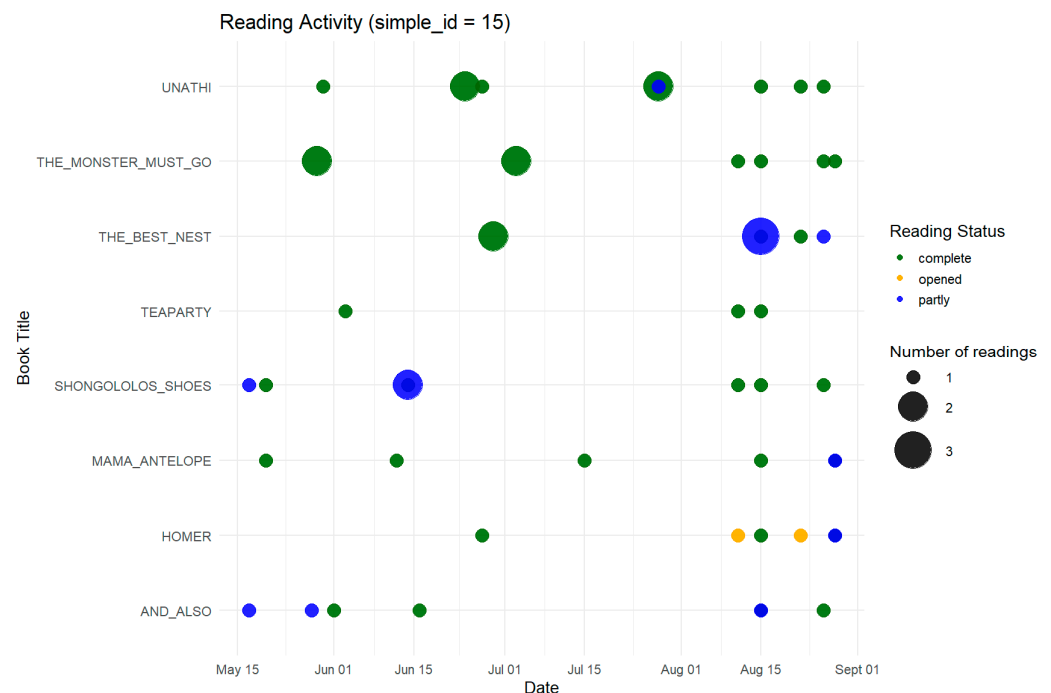


Figure 4. Books read in full or in part by a kindergarten-aged visitor.

3.3. Reading Behaviour

Inspecting the way children navigated stories, a striking result was that navigation was often not straightforward from the first to the last scene. The patterns of going backward during readings may indicate that children had difficulty following the stories. Or, alternatively, they may have been drawn to particular illustrations or events and wanted to repeatedly hear what was happening. For instance, Figure 5 shows the exploration of “Homer” during two visits by a preschool user. In both visits, the user initially read a series of pages but then went backward—after five pages in session 1 and after seven pages in session 2. The user never finished the story. In the first visit, the user returned to the title page four times after reading a few pages, after which the session was discontinued. In the second visit, which took place two weeks later, the user again did not complete the book. However, during this visit, the user progressed slightly further, reaching scene seven, and then revisited several earlier scenes—most of which were later in the story than those explored on the first visit.

Figure 6 shows that the same user follows a similar navigation pattern in the story “Shongololo’s Shoes”, except that this time the book is eventually read in full. In session 1, the user, starting from the beginning, reads only a few scenes—at most four—and repeatedly returns to earlier scenes. In the second session, the user reads up to scene eight, then starts over and continues until scene 11, after which the user again navigates backward. In the third session, the user reads the book straight through to the end without returning to earlier scenes. The same user also read three other books—“Unathi”, “And Also” (Venter et al., 2017), “Teaparty” (Louw et al., 2021), “The Monster Must Go” (Smith et al., 2023), and “Mama Antelope” (Nascimbeni et al., 2019)—without exhibiting these capricious navigation patterns.

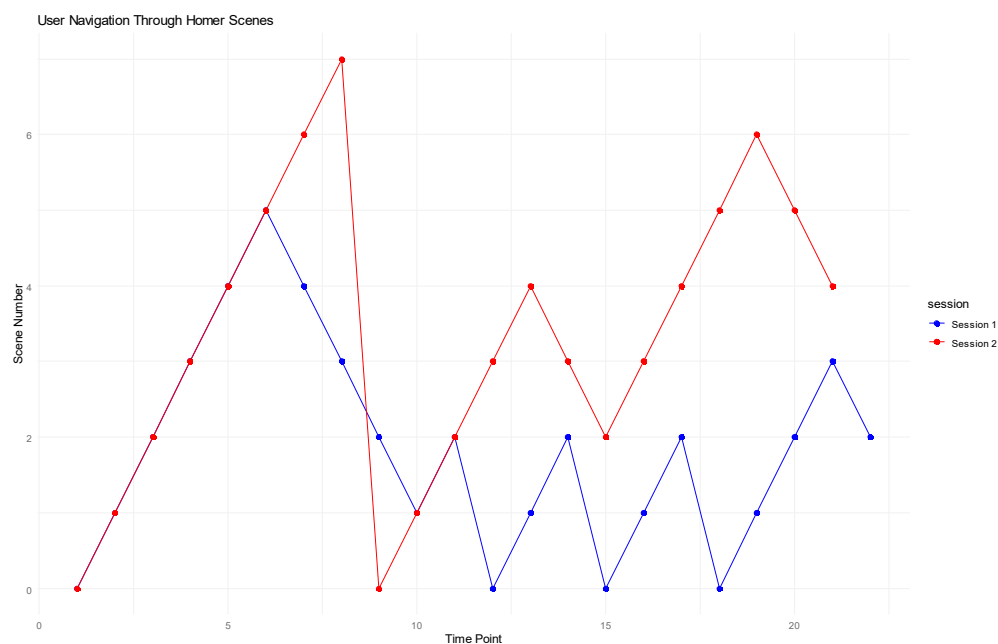


Figure 5. User navigation across scenes in the “Homer” story.

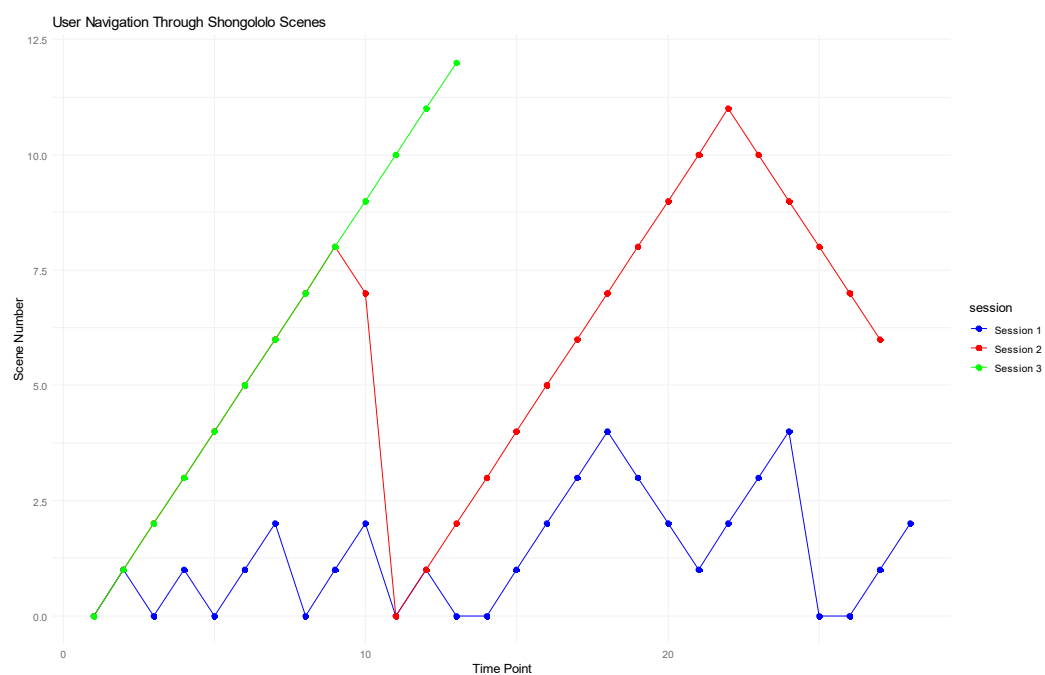


Figure 6. User navigation in “Shongololo’s Shoes” across three sessions.

In the kindergarten group, some users initially navigated back and forth through the stories, as was also observed in the preschool group and illustrated by the examples above. However, these older users mostly went on to complete the book, as illustrated by the navigation in Figure 7.

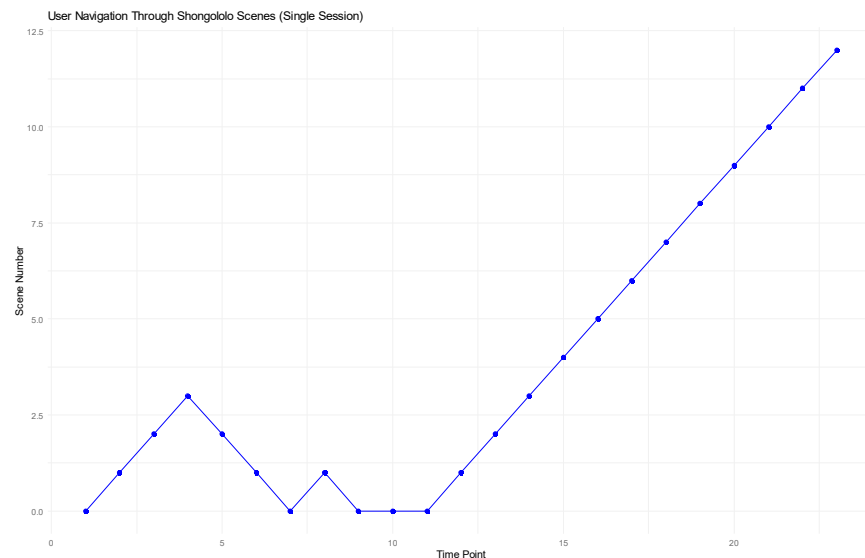


Figure 7. Example of navigation in “Shongololo’s Shoes” by a kindergarten-aged child.

3.4. Language Use

We examined the language preferences of users across kindergarten and preschool levels. Books were categorized as read in full (beyond scene 8) or in part (up to and including scene 7). Language preferences were grouped into two categories: exclusively Dutch, or sometimes/always preferring another language. The alternative languages included Tamazight, Spanish, Turkish, Arabic, and English.

Among kindergarten-aged children, eight who read complete books preferred Dutch; none read complete books in other languages. Among preschool-aged children, eight users read complete books exclusively in Dutch, while five read complete books sometimes or always in alternative languages. Because the kindergarten group had no books in the alternative language category, a chi-square test was not appropriate. Instead, Fisher’s exact test was applied, yielding a p -value of 0.1107. This indicates a non-significant difference in the language distribution of completely read books between kindergarten and preschool children. In both groups, children primarily read books in the societal language, Dutch.

Among the 22 kindergarten-aged users who read books in part, 15 always preferred Dutch, while seven also selected alternative languages. In the preschool group, 36 users read books in part, of whom 23 chose only Dutch and 13 used an alternative language or a mix of Dutch and another language. A chi-square test of independence was applied: $\chi^2(1, N = 58) = 0.00, p = 0.96$. Thus, there is no significant difference in the distribution of Dutch versus other languages for partly read books between the kindergarten and preschool groups. Both levels show a similar pattern of language preferences.

A preschool-aged user, who read most books—12 out of 15—in full in Arabic, demonstrated an interesting bilingual pattern. As shown in Figure 8, while reading “Unathi”, the user alternated between Arabic and Dutch across five visits. In the first visit, the book was read twice in Arabic, followed by four visits alternating between Dutch and Arabic. The same pattern was observed with “And Also”. However, this alternating behavior did not continue with later books, suggesting that switching between languages was, for some reason, unsatisfactory for the user. The subsequent books—“Shongololo’s Shoes”, “Mama Antelope”, and “Teaparty”—were read only in Arabic. This suggests that switching between languages may have been frustrating and ultimately not preferred.

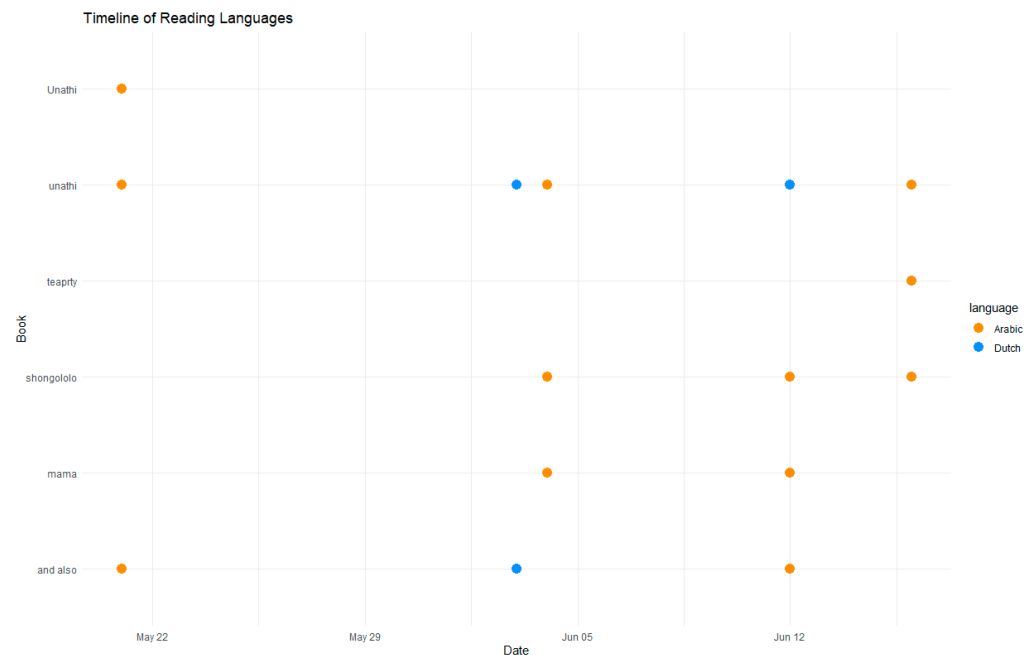


Figure 8. Example of bilingual reading: switching between Arabic and Dutch.

4. Discussion

Exploring the extent to which multilingual users utilize a digital library, we found that of the visitors, a substantial number—approximately 30% ($n = 21$)—engaged seriously with the digital library and read one or more complete books. This number might have been even higher had parents not encountered technical challenges, as they reported during meetings held midway through the period of use. For instance, when using a smartphone to access the library—as many did—the illustrations did not always display fully, reducing important visual details. Several parents also reported losing the website link, even though it had been provided both directly and through the school.

Among these visitors were users who showed sustained, longer-term engagement and continued visiting the library over several weeks. The relatively small size of this group—about one-fifth (19%) of those who read complete books—may indicate that the children did not enjoy the books and consequently stopped visiting the library. However, an inspection of the reading patterns among the frequent visitors makes this explanation unlikely. All four regular visitors read between five and eight different titles, each multiple times, suggesting that despite differing preferences, all books were enjoyed and no strong dislike for specific books was observed.

An explanation for the small percentage of regular and sustained users may be that parents acknowledge the quality of the library and, in general, the usefulness of book reading but do not perceive the need for a routine. In a study of the home literacy environment involving the same group of parents (Bus, 2025), we found that most recognized the value of language-related activities such as book reading. However, consistent with the log data presented here, parents expressed considerable doubt about the importance of establishing regular or sustained book-reading habits. Rating profiles of other parents, presented as short narratives illustrating different home literacy environments (cf. Chen et al., 2025), parents preferred child-initiated book reading. During discussions about book reading routines in the meetings with parents, they expressed concern that enforcing a routine might lead to conflict with the child, and they frequently emphasized that their children were still young and therefore did not require routinized input.

Another hypothesis is that only a minority continued visiting the library because digital books specifically met their needs. In a series of studies (e.g., Plak et al., 2016), we

found evidence for the hypothesis that some children benefit particularly from digital books and therefore may feel more strongly attracted to them. These studies demonstrated that children with certain dopamine-related genetic features—about 30–40% of all children—can gain more from stories in a digital format because this format helps them focus on the story and protects them against irrelevant stimuli.

4.1. Reading Behaviours Typical of Digital Books

This study also revealed not yet described reading behaviours. Sustained readers often moved back and forth within a limited set of scenes, typically the first four to six, before proceeding to later ones. This behaviour may reflect how children engage with the story when they are intrigued but are not yet fully understanding the problem and the character's response.

This strategy appears effective: in cases where children used it, the behaviour did not persist indefinitely. After a few sessions of back-and-forth reading, children typically progressed to reading the entire book. As illustrated by most examples, later sessions involved reading the complete book. In other words, children seem to familiarize themselves with individual scenes and characters through repeated returns, which may support their understanding of the overall storyline.

Adults tend to read books only sequentially; in our repeated observations of shared reading sessions, we rarely saw them move back and forth within a series of scenes, as was found here. We therefore hypothesize that this navigational approach may be particularly common when children read without adult guidance—a hypothesis that we, unfortunately, cannot test in the present study, as information about the setting in which the reading took place is missing.

4.2. Using Languages Other than the Societal Language for Reading Books

In line with previous studies (Bus et al., 2023; Gao et al., 2020), reading rarely occurred in a language other than the societal language—Dutch—even though all families were bilingual or multilingual and the SAYL books were available in multiple languages. In the preschool group, some books were read in full in another language, whereas in the kindergarten group, no books were completely read in a language other than Dutch. Partial readings in another language appeared to be motivated by curiosity (e.g., “How does Turkish sound?”) rather than by a deliberate choice.

The limited use of heritage languages in both age groups may reflect bilingual children's difficulties in comprehending stories in their home language compared to the societal language. Research shows that bilingual children often have a more limited vocabulary in each language, and frequent use of the societal language in daily interactions, such as at preschool and kindergarten, can lead to greater proficiency in that language (Hammer et al., 2014; Flores et al., 2019; Hoff, 2021). Exposure to stories in Dutch at school may further enhance children's competence in understanding Dutch stories compared to those in their home language (Kolancı & Melhuish, 2021).

Moreover, the strong focus on reading in Dutch likely reflects parents' assumption that Dutch is the most beneficial language at this stage. Parents aim to support their children's proficiency in the language of instruction, which is foundational for later academic success.

4.3. Limitations

The findings from this study are based on a small group of visitors, which limits the strength of the conclusions. In addition, the log data have some limitations in determining the exact number of users. We assumed that access from the same device represented the same family. However, it is possible that families used multiple devices, which would

mean fewer unique visitors but a greater number of visits per user. This assumption may have introduced some noise, although likely only to a limited extent.

A further limitation concerns the underestimation of library use due to a programming error. Data for one book—"Who Is the Best"—were missing. This book appeared to be popular, as visits to it were recorded, but these could not be linked to a user. As a result, only data for eight books were included in the analysis, which likely underestimates the total number of readers and reading sessions.

Finally, the lack of personalized log data prevented us from testing possible explanations for the low frequency of visits. Variables such as the availability of devices in the home, parental attitudes toward the home literacy environment, and children's proficiency in Dutch or in their home language could not be related to usage patterns.

5. Conclusions

Despite these limitations, the findings support several important conclusions. The SAYL books effectively promoted sustained reading among a small subgroup. In the kindergarten group, 7% of all visitors returned to the library frequently over an extended period, compared with 4% in the preschool group. Although this is a relatively small proportion, the digital library could still have a substantial impact because it can be made accessible to numerous families at no cost. Assuming a new cohort of 100,000 children each year in the Netherlands, approximately 7000 could benefit from the SAYL library and be better prepared for academic learning.

The SAYL library appears well suited to this purpose. All eight titles for which data were collected were read repeatedly across both age groups, indicating that the books are age-appropriate, engaging, and accessible in terms of both theme and language.

None of the frequent users accessed the library daily; their use was much less intensive, occurring at most twice a week. We wonder whether this pattern is similar for print books or if it is typical for digital reading.

For more than 90% of the families, simply providing access to a digital library did not result in regular or sustained book reading. Whether the number of sustained users can be increased—and how this might best be achieved—remains an open question. It is quite possible that structural limitations, such as parents' beliefs that book-reading routines can be problematic, cannot be easily overcome.

The reading patterns observed further suggest that digital book reading may represent a distinctive form of engagement, rather than merely a digital replication of shared print reading (Marsh, 2016). In particular, some children navigated stories non-sequentially, moving back and forth among early scenes before eventually reading the entire book. This behaviour may reflect a self-guided strategy for building familiarity with characters and narrative structure prior to full comprehension.

Overall, parents tended to favour reading in Dutch, likely not only because children may be more proficient in the societal language but also because parents assume that reading in the language of instruction is academically beneficial. This may be an important area for further guidance for both parents and teachers. Research suggests that strengthening children's proficiency in the home language through book reading not only supports the home language but can also support second-language development (Cummins, 2000; Stangeland et al., 2025). Parents—and possibly teachers—may not yet be aware of this advantage and may therefore not implement reading practices that also support the home language.

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