# Beyond the Page

## *A new adventure with each read*

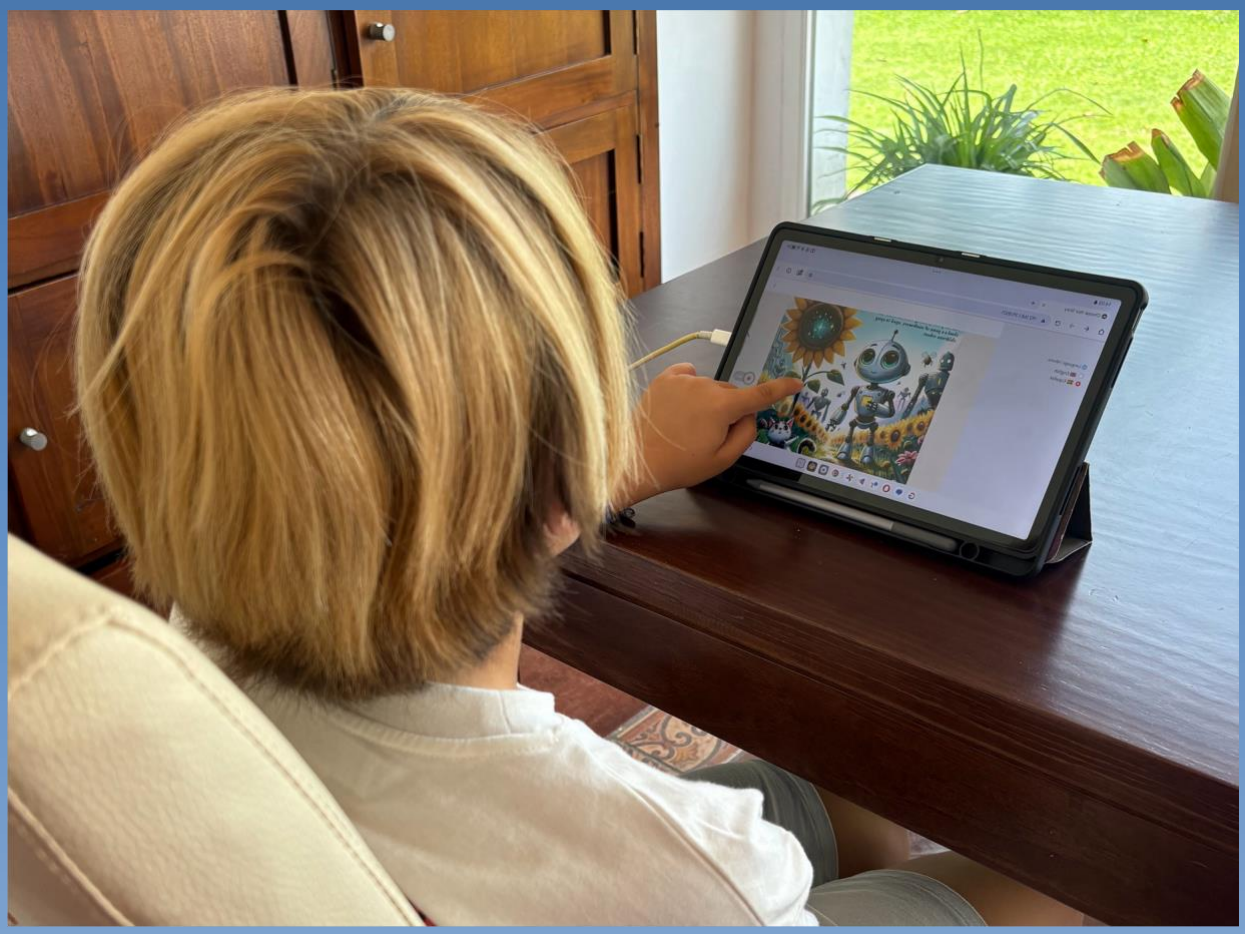

*Figure 1. Image taken from the user testing, with authorization from the parents.*

# Final Project File

| | |
|---|---|
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**Abstract**

This project explores how generative artificial intelligence can transform traditional storytelling into a personalized, educational, and inclusive experience for children. “Beyond the Page” is a web-based application that allows children to create interactive stories by choosing characters, settings, tone, and complexity. It uses models such as GPT-3.5 and DALL·E to generate unique narratives and child-friendly illustrations, available in multiple languages with audio support.

The application context lies at the intersection of UX design, child-computer interaction, and digital learning. Using a user-centered methodology—combining desk research, questionnaires, benchmarking, wireframing, and user testing—the project addresses the lack of adaptable storytelling tools for children with diverse needs.

User testing revealed high levels of satisfaction, particularly in customization, engagement, and the ability to explore language learning through play. Participants appreciated the mix of traditional and original characters, interactive structure, and voice narration.

Key conclusions highlight the potential of the app to enhance imagination, language development, and intergenerational bonding. Future improvements include adding multi-character voices and a more visually dynamic interface. Overall, “Beyond the Page” demonstrates an innovative approach that blends AI, storytelling, and child-focused UX to create richer, more sustainable reading experiences for curious young minds.

**Resumen del trabajo**

Este proyecto explora cómo la inteligencia artificial generativa puede transformar los cuentos infantiles mediante una experiencia personalizada, educativa e inclusiva. “Beyond the Page” es una aplicación que permite a los niños crear historias interactivas a partir de sus elecciones, incluyendo personajes, escenarios, tono y dificultad. Utiliza modelos como GPT-3.5 y DALL·E para generar relatos originales , disponibles en varios idiomas y con soporte de audio.

El contexto de aplicación se está en el cruce entre el diseño UX y el aprendizaje digital. Incluye revisión bibliográfica, cuestionarios, benchmarking, prototipado y pruebas de usuario. Este proyecto responde a la falta de herramientas narrativas digitales que se adapten a las necesidades de cada niño.

Los resultados de las pruebas con usuarios demostraron altos niveles de satisfacción, especialmente por la capacidad de personalización. Los participantes valoraron positivamente la diversidad de personajes y escenarios, y la inclusión de audio.

Entre las conclusiones destacan el potencial del proyecto para apoyar la imaginación, el aprendizaje lingüístico y la conexión intergeneracional. También se identificaron mejoras para futuras versiones, como la incorporación de voces distintas para los

personajes o una interfaz más atractiva. En suma, “Beyond the Page” representa una propuesta innovadora para fomentar una experiencia de lectura aún más divertida y enriquecedora.

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# 1. Introduction

Beyond the Page is an interactive storytelling app that uses generative AI to help children create personalised stories with a playful illustration at the end. By allowing users to input their preferences, such as the story's tone, setting, or main character, the app generates unique narratives available in English and Spanish and includes audio support.

This project reimagines traditional Storytime through a digital and educational lens. It focuses on user-centred design and inclusivity, aiming to make storytelling more engaging and adaptable to different learning styles and age groups. The following report outlines the development process, design decisions, and key insights gathered from testing, as well as future directions for the tool's growth.

## 1.1 Context and Justification

A cherished activity in the lives of children that has stood the test of time and entertained generation after generation has been story time. Usually done in the evening, alongside a parent or guardian, or sometimes can be done alone as an escape into a fantasy world that cultivates the imagination. Other times, Story time can serve as an educational tool in a class setting and can be used to foster language development and creativity. This project aims to enhance this valued moment and offer a different tool that can be used alongside traditional storybooks.

This project proposes a tablet-based generative digital storybook that uses the child's input and their chosen settings to generate stories with accompanying illustrations based on traditional storybook characters. Using beloved traditional storybook characters—such as Little Red Riding Hood and Goldilocks— our project "Beyond the Page" generates alternate narratives, placing these characters in new settings, contexts, and adventures prompted by the child's choices.

By using the correct parameters Generative AI presents a new opportunity to create personalised and interactive stories that foster imagination within the limits of child-friendly stories, leveraging AI to enhance children's learning and imagination.

Physical storybooks lack the adaptability to serve each child's preferences, needs, and developmental levels. Anecdotally, physical storybooks can often be set aside after a few reads, and left to collect dust in a child's room. "Beyond the Page" aims to reimagine these books and characters in ways that make them become interesting again with each read. It offers the child the opportunity to lead an adventure with their favourite characters and potentially minimize the physical waste caused by these books.

Generative AI provides us with a significant advancement in the field of interaction design and user experience (UX/UX). It allows designers to offer the user personalised experiences that

adapt in real time and offer a tailored outcome that can respond dynamically to the user's needs and desires. In this case, the role of the designer is to set the parameters and create a context that can lead the generated content to produce something of value for the user. In the scope of digital storytelling, this is a concept full of potential, and can be used to create playful interactions aimed at supporting development and helping grow the imagination. This project aims to contribute to the UX field by exploring the intersection of AI, storytelling, and children's cognitive engagement, proposing a model that adapts to different user's needs.

The primary need this project addresses is the lack of customizable interactive digital storytelling experiences for children. While there are existing digital storybook applications and toys, most of these use pre-written narratives with limited personalisation options. Some AI-powered storytelling tools, like OpenAI's AI Dungeon or Google's Story Speaker, are not specifically designed for. Additionally, existing AI-generated storytelling tools often lack child-friendly illustrations.

Drawing from research in child psychology, digital learning, and AI-driven content, this project builds on studies showing that interactive storytelling boosts engagement and helps kids retain information (Bruner, 1990; Zipes, 2004). UX and AI research also emphasize the power of personalisation in making digital experiences more effective and enjoyable (Norman, 2013; Resnick, 2017 ). By blending these insights, this project aims to close the gap between

technology and storytelling—creating a tool that's not just entertaining, but also educational and inspiring for young, curious minds.

## 1.2 Project Objectives

In the planning and execution of any successful project, it's crucial to clearly define its objectives. To develop this project, the Moscow method has been used to prioritise the various objectives. This method categorises the project requirements into four groups: Must Have, Should Have, Could Have, and Will Not Have. This allows for an efficient allocation of resources and focused development.

| |
|---|
| **Must Have:** A web based experience that takes initial input to create a prompt, that is sent to an llm and gen ai image generator to show a different story each time depending on the input. |
| **Should Have:** Option to choose character's and generate stories of them in different contexts and settings, based on input. |
| **Could Have:** Some sort of audio, be it background music or AI generated sounds etc. Could use elevenlabs api to generate natural sounding voices to read the stories out loud. |
| **Will Not Have:** A place to save stories and go back to them, but this is a future possibility. |

In addition to defining clear and structured objectives through the MoSCow I have employed the SMART goals framework to establish and communicate these objectives effectively. This framework ensures that each goal is Specific, Measurable, Attainable, Relevant, and Time-based. This framework provides a structure that allows to monitor progress and achieve tangible results.

| |
|---|
| **Specific:** I intend to create a website-based interactive storybook that generates stories and accompanying images that uses a large language model like GPT, and a generative image tool like DALL-e. It should start with an opening screen allowing the child to input their preferences, what character's they want in it, and what genre. This input should be used to form a prompt that is used to generate the story. |
| **Measurability:** I will know if the project is accomplished if the design decisions made are supported by the user research I have done. If the project can successfully generate a story and accompanying images based on initial input. |
| **Attainability:** In order to attain this goal I will need to further familiarize myself with GPT's API, especially in the structuring of prompts, and integrating image generation to them. I then will also need to create a web-based structure to display this. |
| **Relevance:** I believe this goal is relevant to my future plans as it involves Children, storytelling an generative ai, all topics I've explored before and am interested in pursuing further. |

**Time Based:** This project is time sensitive not only for the deadline but also to potentially write a paper on it.

## 1.3. Impact on Diversity and Ethics

This project is designed with inclusivity, accessibility, and responsibility in mind. It offers audio on all pages in both English and Spanish for children with reading disabilities and different levels of story complexity for children of different ages.

Child safety and privacy are also top priorities in this project. The platform does not require logins or collect personal data, and all AI-generated content will be filtered. Future iterations will further enhance these safeguards by exploring additional parental controls, transparency tools, and ethical design practices tailored to children's digital interactions.

Sustainability is also a key focus. Unlike physical books that are often discarded, our tool provides endless new stories without contributing to paper waste. The AI processes will be optimized to minimize energy consumption.

At its core, this project aims to provide children with a safe, imaginative, and empowering storytelling experience, one that embraces diversity, protects their privacy, and respects the world in which they are growing up.

## 1.4. Focus and Methodology used

To develop this project, User-Centered Design (UCD) will be the main focus. Iteration and validation will be at the forefront of the process, guided by the target users—children, educators and their families. A combination of qualitative and quantitative methodologies will be used to ensure that the final product aligns with users' needs.

*1. Research and Analysis*

**Objective:** Understand the needs, expectations, and challenges children face when interacting with AI-generated digital storybooks.

1.1 **Literature Review (Desk Research)** – Analyze studies on interactive storytelling, childhood learning, and UX design for children.

1.2 **Interviews & Surveys** – Conduct surveys with parents and educators.

1.3 **Benchmarking** – Evaluate similar tools available on the market to identify their strengths and weaknesses, learning from existing solutions.

**1.4. Technical research** – Understanding the limitations and requirements of different genai models and choosing which one to use.

*2. Definition of features and Wireframing*

After the research phase, starts the definition of features and initial wireframing.

**2.1.** **Create user personas** to imagine how different children might use the tool.

**2.2.** **Map the user journey** to visualize how they interact with the product, from the moment they start until they finish their story.

**2.3.** Sketch Wireframes to design structure and interaction flows

*3. Functional Prototype Development*

Now, it's time to bring the project to life:

**3.1.** **Integrate GPT and DALL-E** to generate personalized stories and illustrations.

**3.2.** **Build the web version** using accessible technologies designed for children's interactions.

**3.3.** **Define key parameters** to ensure that the AI generates safe, appropriate, and engaging stories.

*4. Testing and refinements*

This phase is to better the product and interate on it.

**4.1. Observe how children and educators interact with the tool** and collect direct feedback.

**4.2. Make adjustments to the interface and user experience** based on what works best.

**4.3. Compile a report** detailing the entire process, findings, and improvements made.

**4.4. Propose future development ideas**, exploring how the tool can evolve and expand.

## 1.5. Planning and Time Management

This Gannt chart shows the planning for the project, and it can be found on Figma through this link:

https://www.figma.com/board/RyDKzQauivTrjtmmrdSPXg/Untitled?node-id=0-1&t=ExRtrVH9oA2ab7gg-1


Figure 2

## 1.6. Summary of Deliverables

The key deliverables of this project include a web-based prototype of *Beyond the Page*, an interactive storytelling platform powered by generative AI. The prototype includes: features like personalized story creation, language switching, child-friendly illustrations, and story narration. Supplementary materials include wireframes, user testing reports, accessibility considerations, and a comprehensive design rationale. A detailed breakdown of each deliverable is provided in the following chapters.

## 1.7. Overview of other chapters

The subsequent chapters of this document follow a logical progression, starting with the background and justification for the project. Chapter 2 presents the research and methodology, including literature review, benchmarking, and user

personas. Chapter 3 outlines the development process, from wireframes to the functional prototype. Chapter 4 covers user testing, analysis of findings, and design iterations. Chapter 5 concludes the report with a summary of results, reflections, and future development ideas. Additional sections include a glossary, bibliography, and annex with supporting materials.

# 2. Materials and methods

## 2.1. Desk Research

Storytelling is one of the oldest forms of human communication and has historically served as a popular way to pass knowledge from one generation to another. Usually done at bedtime between parents or caretakers and children, results show that the introduction of social stories before bed reduces children's disruptive bedtime behaviours and betters their sleep (Burke, Kuhn, & Peterson, 2004). Digital storytelling has also been shown to enhance children's interest in learning and provides a platform for learning to be fun and relaxing (Leong Chiew Har, Zainol Abidin, & Saibon, 2019), while also being linked to enhancing preschoolers' reading, speaking, and listening abilities. Moreover, storytelling extends beyond vocabulary enrichment to fostering imaginative capabilities in children, providing a platform to express their ideas and opinions (Isbell et al., 2004).

Generative Adversarial Networks or GANs offer an opportunity to create endless stories and can be tools that enhance and support children's imagination. But at the same time, children are increasingly being exposed to GANs, and the negative use of these can impact students. Children might not know about their use and might believe that a fake event or image is real. Because of this, educators must teach them about GANs (Ali, DiPaola, Lee, Hong, & Breazeal, 2021). As a designer, ethical practices when introducing GANs to children's tools are essential, like establishing data protection policies and data minimization, first asking for informed consent from parents or guardians, and providing transparency in the development and application of this prototype (Baskara, 2023).

This project aims to introduce GANs through an entertainment or artistic perspective and use these models to create a first-generation prototype as a proof of concept. It also will attempt to be used as a tool to familiarise children with these models. Because of this, future iterations will have K12 AI Literacy principles as a part of the experience.

## 2.2. Benchmarking


*Figure 3. Bedtime Story AI image*

BedtimeStory.ai is an AI story-generation platform made by Linus Ekenstam. It lets users create AI-generated stories with custom themes and characters, but the experience is mostly passive. Children listen after choosing the initial settings rather than shaping the story on the go. Beyond the Page takes this further by making storytelling interactive, letting children guide the adventure and using known characters like Little Red Riding Hood.

BedtimeStory.ai uses AI-generated images that can feel generic, and some users report that don't fully match the story (Robin, 2024). Beyond the Page ensures engaging, child-friendly illustrations. While BedtimeStory.ai focuses on

entertainment, Beyond the Page is designed to boost creativity, language skills, and cognitive development.

Ultimately, Beyond the Page builds on what BedtimeStory.ai does well but adds more interactivity, richer visuals, and has a stronger educational focus.

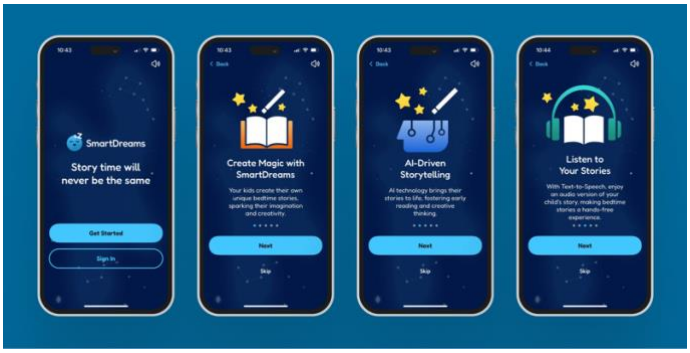


*Figure 4. Smart Dreams AI image*

In contrast, SmartDreams.ai focuses more on fostering creativity through story generation, but based on reviews, it also has room for improvement in terms of customization. It provides AI-generated stories but may lack deeper personalization and interactive on-the-go elements. Additionally, neither of the two mentioned platforms offers Accessibility nor inclusivity features, or

language development which could be a differentiating factor for Beyond the Page.

*Figure 5. Oscar Stories Logo*

Oscar Stories sets itself apart from the other two because of how personalized its AI-generated stories are. They adapt to the child's input and preferences. It also allows for dynamic story creation, with child-friendly illustrations based on the storyline. The platform also promotes interactive language learning by encouraging children to make choices that influence the narrative.

After this benchmarking exercise, the focus of Beyond the page has to go further than simply generating interactive stories. The need for inclusivity and language development aspect of the tool is necessary to differentiate this product from what is available on the market.

## 2.3. Personas

Lucas - The Curious Learner

Figure 6.

**Characteristics**

- **Age**: 4 years old
- **Language**: Primarily English, but wants to learn Spanish to communicate with his **Abuelita**
- **Learning Style**: Kinesthetic learner who loves engaging through music and drawing.

**Goals**

- Pablito is eager to connect with his **Abuelita** in Spanish. He wants to feel empowered to learn through play. Conventional language-learning methods bore him.
- He enjoys creative exploration and storytelling, making *Beyond the Page* a perfect fit for him—offering opportunities for interactive narratives and immersive adventures in both English and Spanish.

**UX Needs**

- Pablito benefits from **interactive, visual content** with **minimal text** to keep him engaged.
- **Simple, playful interactions**. *Beyond the Page* can integrate interactive elements like singing or drawing as part of the story.

**Frustrations**

- Pablito finds traditional language-learning tools, like Duolingo, boring and not fun. He dislikes textbooks.
- **Beyond the Page** can keep him engaged with dynamic, evolving stories making language learning a part of his playtime, and not a task.

**Personality**

- High energy, loves to laugh, and enjoys imaginative play

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Abuelita Milagri - The Caring Grandmother

Figure 7.

**Characteristics**

- **Age**: 77 years old
- **Language**: Spanish, only speaks Spanish
- **Learning Style**: She enjoys storytelling but needs clear, user-friendly technology that's simple to navigate.

**Goals**

- **Abuelita Milagri** wants to be able to communicate with **Pablito**, and *Beyond the Page* can help by offering a tool that builds a bridge between their languages.
- She hopes to gift Pablito an experience that enriches his learning while deepening their relationship through shared stories.

**UX Needs**

- **Easy-to-understand interface** that doesn't require much technological knowledge. The app should be simple.
- **Affordable** and easy to access on a tablet or mobile device..

**Frustrations**

- She feels the **sadness of communication barriers** with Pablito, as his busy parents and limited school exposure to Spanish make it hard for them to bond.
- A platform like *Beyond the Page* can help bridge this gap by offering both **Spanish and English** language options, allowing Abuelita and Pablito to enjoy stories together.

**Personality**

- Wise, loving, and often looks for meaningful ways to connect with Pablito. She would appreciate a simple, joyful way to share stories and communicate better.

## 2.4. Questionnaire and Results

The following questionnaire has been designed and sent out to educators and parents. The questionnaire has been sent to 2 educational group chats focused on preschool education in the United Kingdom, and various parents and school teachers from Spain to ensure a global perspective. The questionnaire's responses reflect a carefully picked group of mostly teachers and parents who are curious about how technology can support children's storytelling.

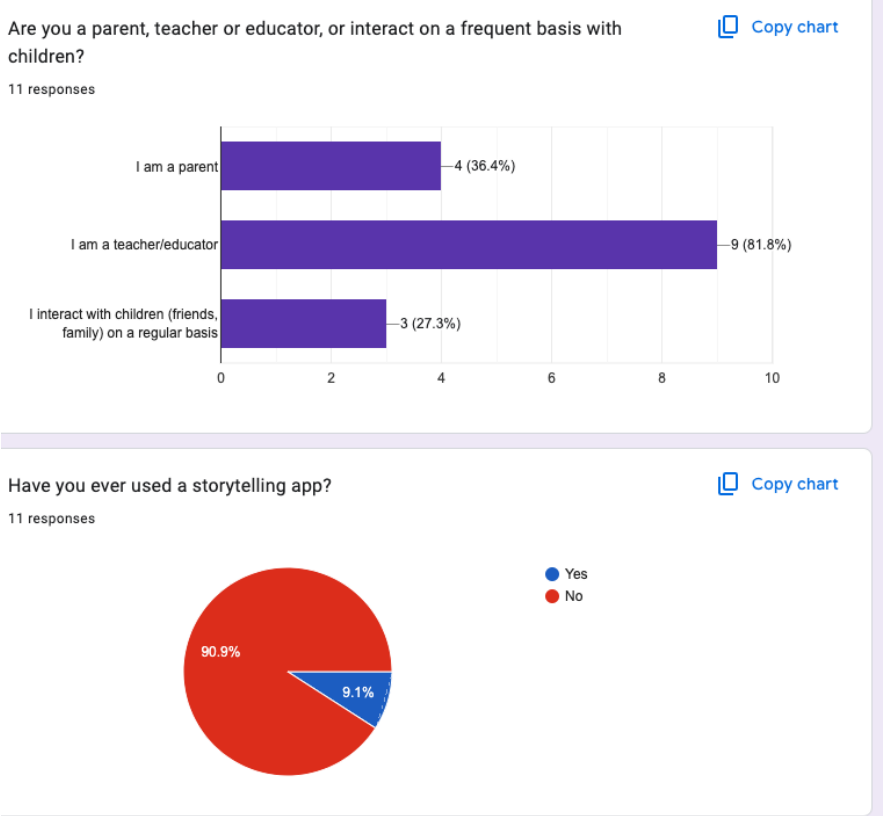
Are you a parent, teacher or educator, or interact on a frequent basis with children?
Copy chart
11 responses
I am a parent
4 (36.4%)
I am a teacher/educator
9 (81.8%)
I interact with children (friends, family) on a regular basis
3 (27.3%)
0
2
4
6
8
10
Have you ever used a storytelling app?
Copy chart
11 responses
Yes
No
90.9%
9.1%

Figure 9.

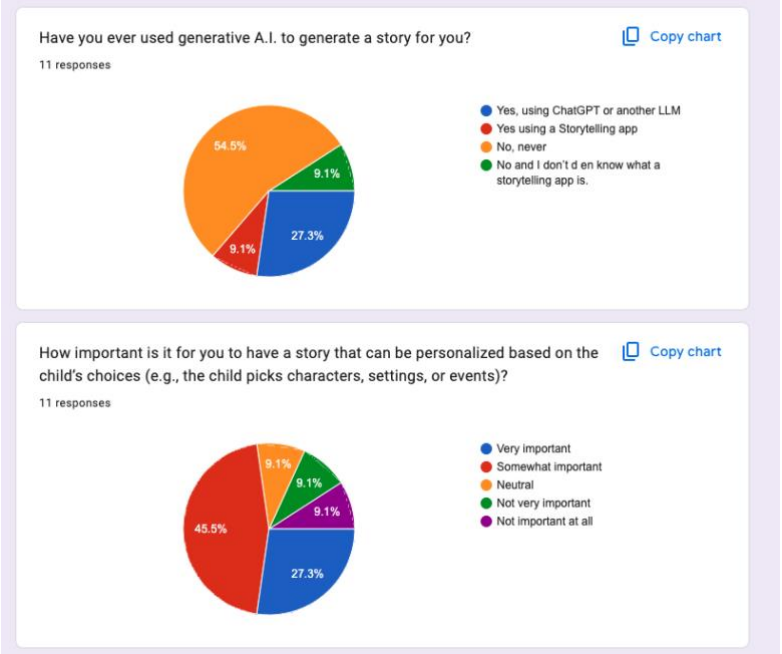
Have you ever used generative A.I. to generate a story for you?
Copy chart
11 responses
Yes, using ChatGPT or another LLM
Yes using a Storytelling app
No, never
No and I don't d en know what a storytelling app is.
54.5%
9.1%
27.3%
9.1%
How important is it for you to have a story that can be personalized based on the child's choices (e.g., the child picks characters, settings, or events)?
Copy chart
11 responses
Very important
Somewhat important
Neutral
Not very important
Not important at all
9.1%
9.1%
9.1%
45.5%
27.3%

Figure 10.

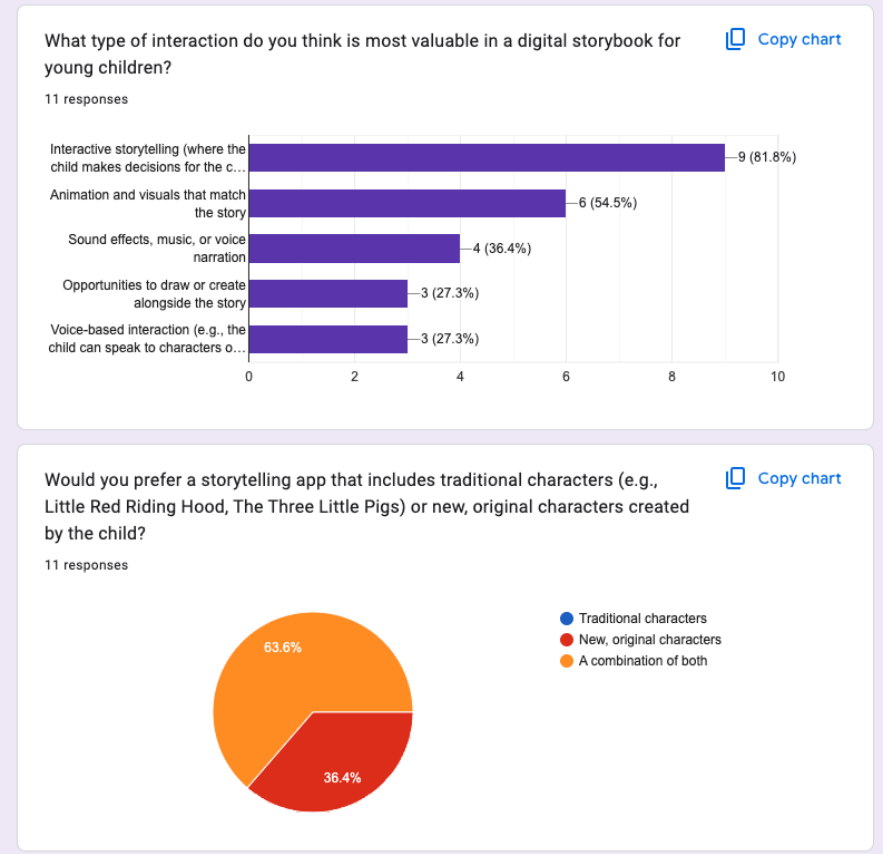


Figure 11.

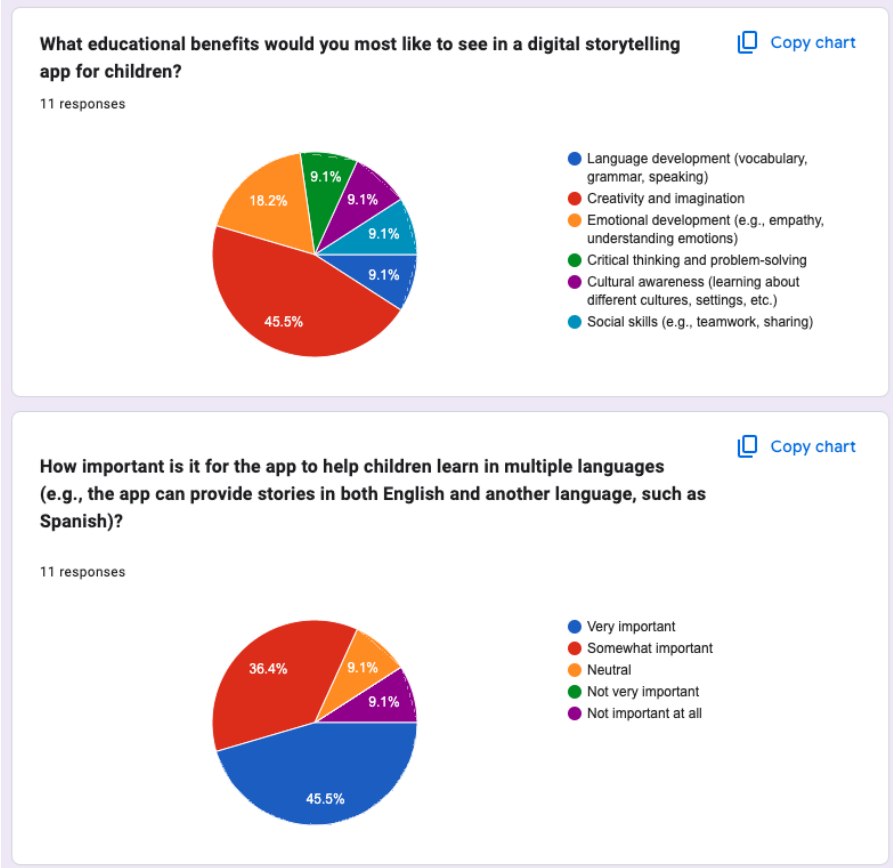


Figure 12.

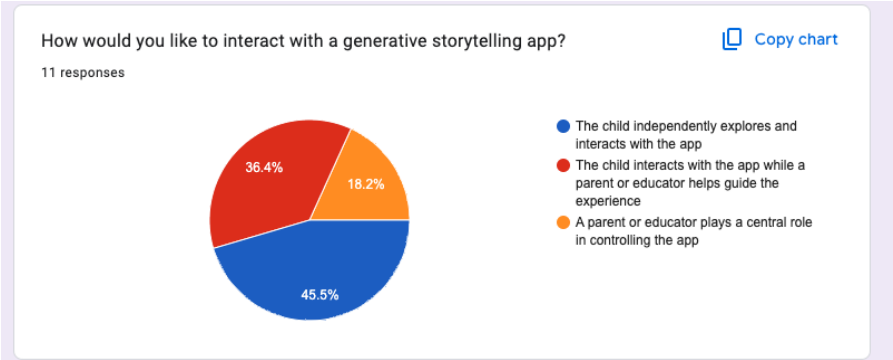


Figure 13.

*Questionnaire results overview*

While many haven't used storytelling apps or generative AI before, the responses show a growing interest. Especially in creating a tool that can allow kids to personalize stories by choosing characters or settings.

Interactive storytelling where the child makes choices was the most valued feature. Respondents also preferred a mix of traditional and original characters, suggesting a balance between familiarity and creativity. This information informed the flowchart and wireframe to include options to add your own character or choose a predetermined one. Educational goals like inspiring imagination, developing empathy, and promoting cultural awareness were frequently mentioned.

Multilingual options, to be able to repeat the stories in two languages, especially for English and Spanish, were seen as important by many. Regarding on how the app should be used, opinions varied. Some preferred child-led exploration, others preferred guided experiences with adults. Flexibility seems key to meeting diverse needs so that this tool can be useful and interesting to users.

Questionnaire:

https://docs.google.com/forms/d/e/1FAIpQLSdWCWaFogOTP-k00BXusGpRzmXUYsyXMa3lugrYGPmnqH2xUQ/viewform?usp=dialog

## 2.5. Usage Scenarios

Figure 14.

*DALL-E generated Image of Pablito and Abuelita*

### Scenario 1: Storytime at night with Abuelita

**User:** Pablito is an energetic 4-year-old who loves stories and wants to learn Spanish so that he can talk to his Abuelita.

**Setup:**

It's Saturday afternoon, and Pablito is visiting his Abuelita Milagri. He loves spending time with her but there's one problem that gets in their way. La Abuelita only speaks Spanish, and he only speaks English. He wishes he could tell her all about his preschool, but he just doesn't know how.

Pablito's parents set up *Beyond the Page* on a tablet, hoping it will help them connect through stories.

**Action:**

1. Pablito climbs onto the couch next to Abuelita and opens the app on his tablet. They pick the settings for a story, in this case—*El Bosque Encantado* (*The Enchanted Forest*).
2. Abuelita selects bilingual mode so she can see the words in English while Pablito sees them in Spanish.

3. As they read it Pablito taps on tricky words to see the translation, and the app pronounces them in Spanish. They giggle as he tries to repeat them. Abuelita claps and cheers him on.
4. They get to a part where they have to wake up a sleepy dragon by singing a song. The app plays a melody, and they sing together, laughing when Abuelita gets the words wrong on purpose.
5. Pablito draws his own dragon on the screen, making it bright green with purple wings. “¡Mira, Abuelita!” he says proudly.
6. After finishing reading the story, Pablito has learned a few new Spanish words feels closer to Abuelita.

**Outcome:**

Later that evening as they’re eating dinner with the family, Pablito surprises everyone by asking for “agua” instead of “water.” Abuelita’s face lights up and gets excited. *Beyond the Page* has done more than teach him new words, it has brought their family even closer together.

## 2.6. Mind Map

https://miro.com/app/board/uXjVI6J_hpw=/?share_link_id=197413110000

This Mind map shows the process of creating the story from the child's perspective. The flow begins with selecting a character from familiar figures like Peter Pan or Rapunzel, or inventing one of their own. Next, they choose where the setting will be: such as the jungle, space, or the beach. Again this has the option to describe their own. Then, they are asked to pick a companion for the character, like a cat, astronaut, or ant. Once all choices are made, the story is generated based on the selected elements. This structured but also flexible design encourages creativity, and storytelling taking into account the results of the questionnaire that I mentioned in the previous point.


*Figure 15. Flowchart screenshot*

## 2.7. Wireframing and interactive Prototype

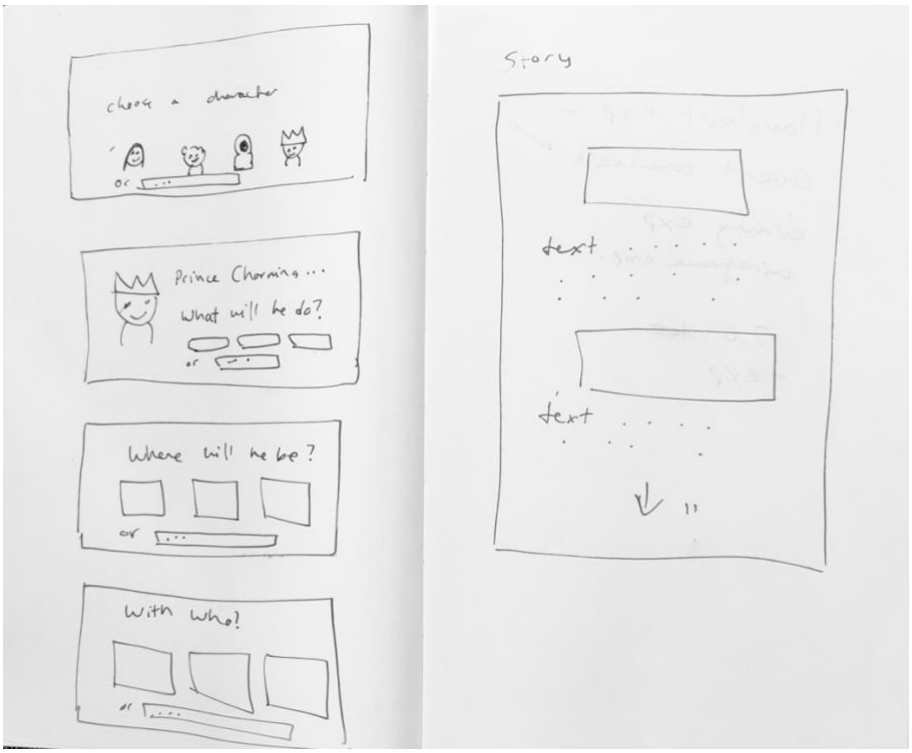


*Figure 16. Initial Sketch*

The initial sketch was a basic visualization of the main structure of the project.

It showed the prompt creation and the generated story structure.

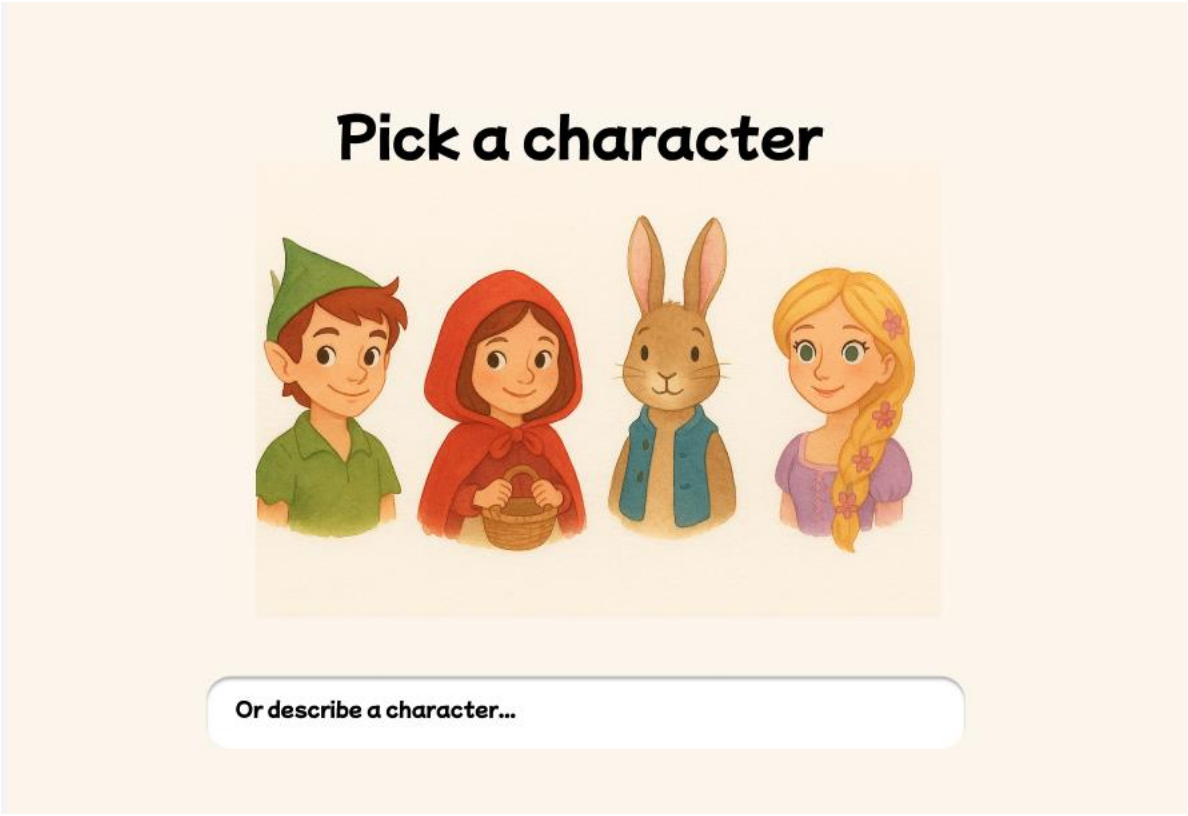


*Figure 17. Basic wireframe detail 1*


*Figure 18. Basic wireframe detail 2*

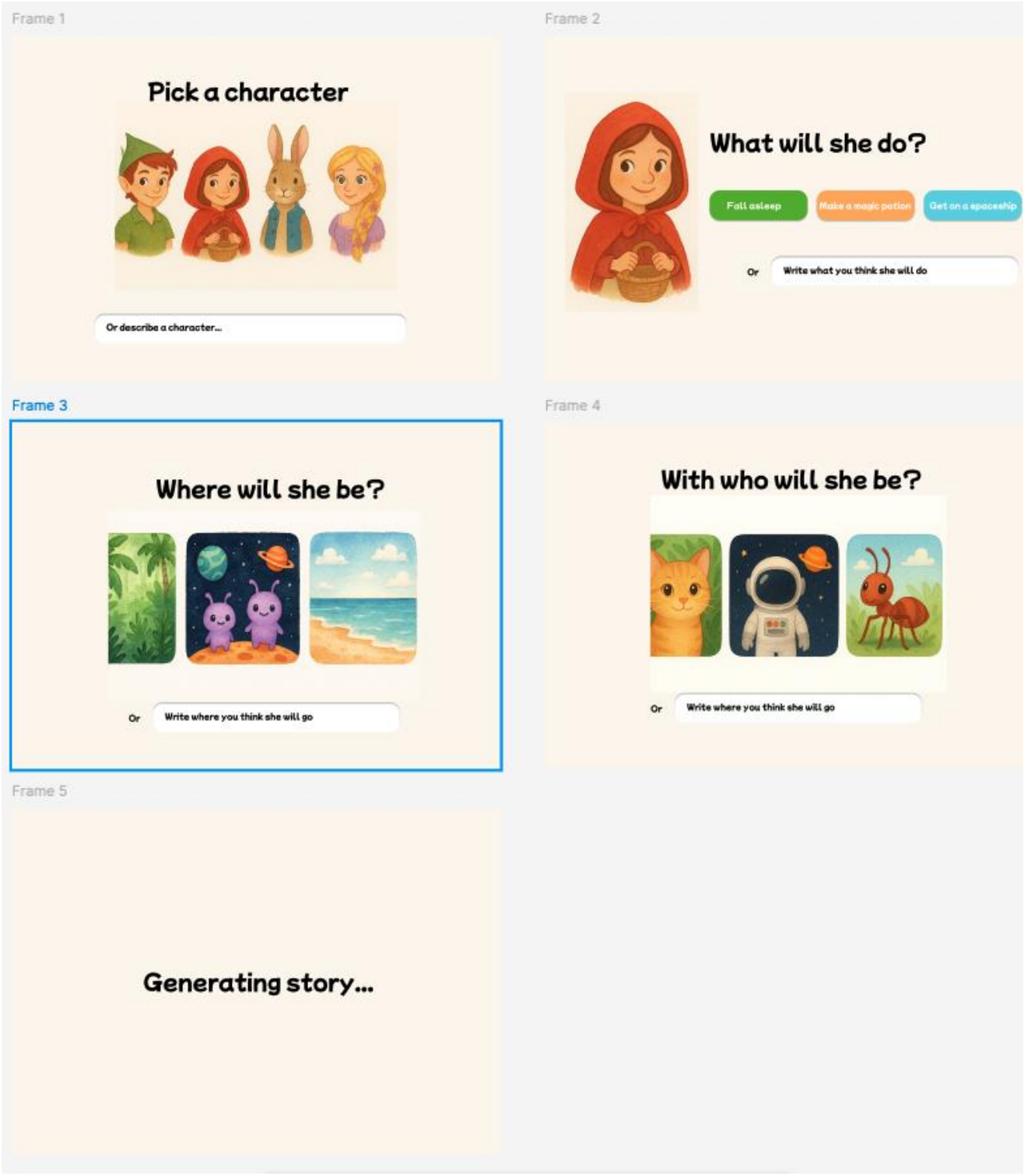


Figure 19. *Basic wireframe*

https://www.figma.com/design/NIZQruGANunVTE2Buw74TY/story-1?node-id=0-1&p=f&t=BwForWrGe1bMu5ei-0

This wireframe shows the initial ideation for the project. It shows the prompt generation process from the perspective of the child, which will later be sent to the GPT API to make the story. The initial prompt for the images make sure to describe the use of watercolor style children's illustrations. This choice was informed by traditional illustrations in storybooks, like Peter Rabbit, that bring a feeling of warmth that I believe many AI-generated images lack. This is crucial when creating a project for children, as they need to feel comfortable with the illustrations.

The experience begins with character selection, where kids can choose from illustrated figures like a bunny or Little Red Riding Hood, or describe their character. Then, the child decides what the character will do (fall asleep, make a potion, go on a spaceship), where the story takes place (like a jungle, space, or beach), and who the character is with (such as a cat, astronaut, or ant). The

choice of these things, places, and companions has been made by me, but if possible, I have the intention to make a randomised list that changes these options each time the story is read.

These options are there to add a visual element and to make the choices easier for children that are less comfortable with typing. Each screen includes a simple open text box to allow for more personalised or imaginative responses, giving children (or the adults guiding them) the option to go beyond the predetermined options. Once all inputs are selected, the app moves to a "Generating story…" screen, where the narrative is created based on the child's choices. In this case some of the 3 squared images rendered a bit strangely but it's something that I will look into in the next wireframe.

This wireframe reflects important insights I gained from the questionnaire: a preference for interactive storytelling, customizable experiences, and a mix of familiar and new characters. It's designed to be engaging and inspire creativity. But I also wanted to leave room for language options in the next iteration.

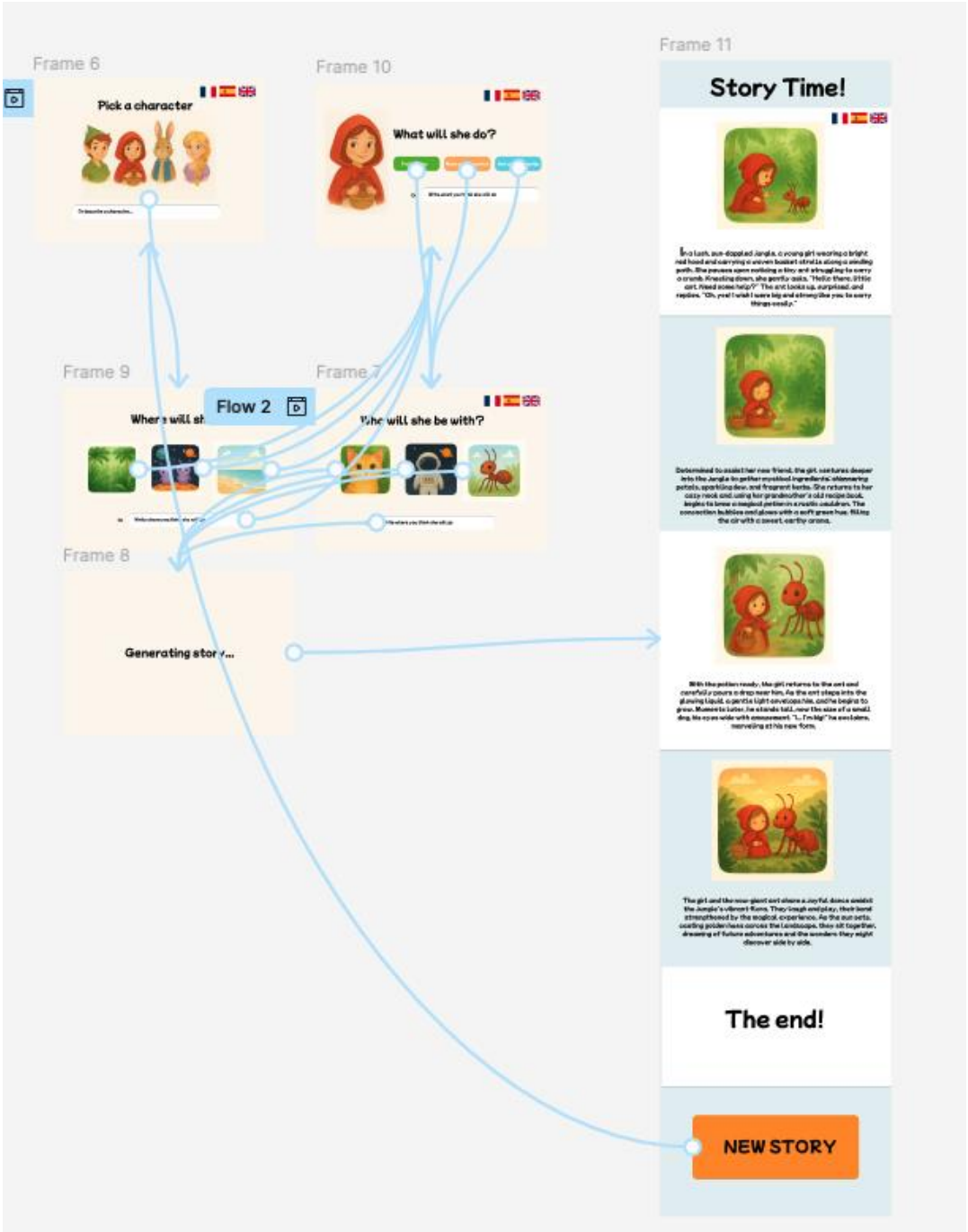


*Figure 20. Interactive Wireframe 1*

https://www.figma.com/proto/NIZQruGANunVTE2Buw74TY/story-1?node-id=21-93&t=73RHAF0Uk7lxoGpc-1&scaling=min-zoom&content-scaling=fixed&page-id=21%3A92&starting-point-node-id=21%3A93&show-proto-sidebar=1

This interactive wireframe shows the process of generating a prompt and then an example of a generated story. The prompt generation has the same structure as before: the flow begins with a structured prompt creation process, guiding the user step-by-step to select a character, setting, action, and companion. This is version 2.0. Includes better images, and the option to show the story in English, Spanish or French. To do this I purchased GPT pro.

Once the story is generated, it shows it alongside the images, and the child is able to scroll through the story. This also has the three-language option. The child can move through the story at their own pace, switching between languages at any point to hear or read the narrative in their preferred language.

At the end of the narrative, there is a button to generate a new story, which starts the whole process from the beginning.

# 3. Testing and Evaluation of version 1.0.

## 3.1. Version 1.0. overview

The following are screenshots and explanations of the interaction shown to the users for testing. You can find this project and all the previous and subsequent versions on github: https://github.com/lauradowell/book-app

This version uses Streamlit for the web infrastructure, as it allows for a seamless incorporation of multiple elements needed for this project, such as API connection and audio streaming. It's programmed using Python, and uses GPT 3.5 turbo because it was the right balance between price, speed, translation abilities, and creative story generation. For the image generation it uses dall-e-3 at standard quality.


Figure 21.

This is the first page of the interaction. There are 4 options provided that are fixed, and the option to introduce your own character. The whole page is narratable by pressing play on the audio bar. Images were deleted on the settings pages to simplify the project.

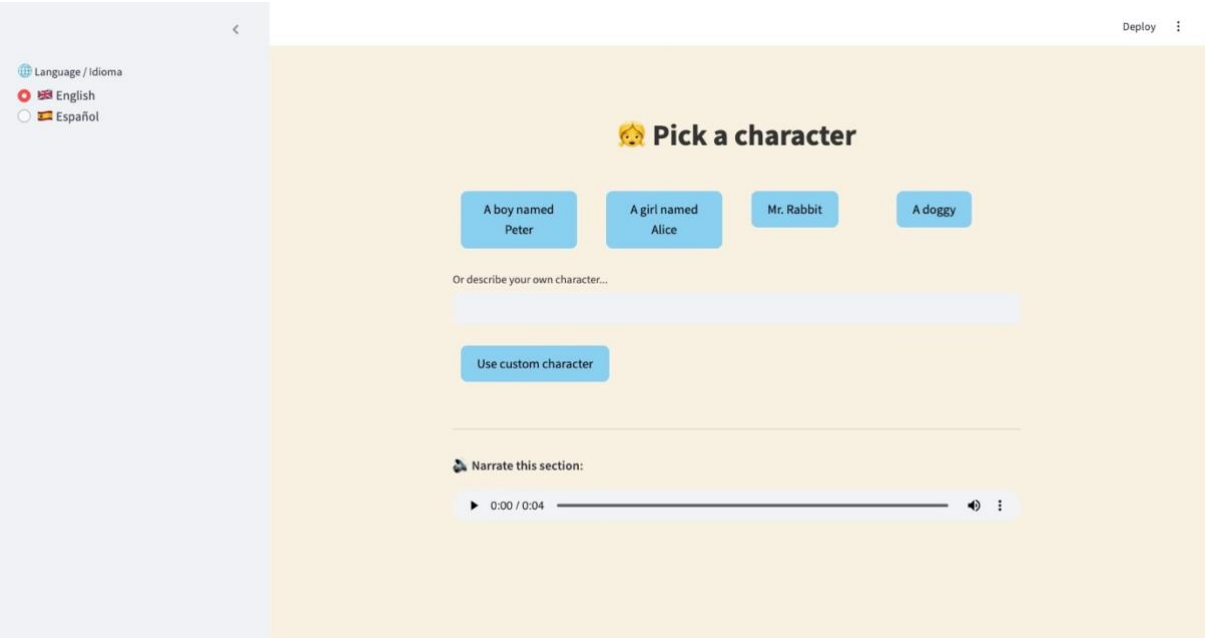


Figure 22.

This is the tab option on the left that allows to change at any point of the interaction to Spanish or English, including the narrated text.

Figure 23.

This shows how one can introduce your own character, in this case, an orange cat.

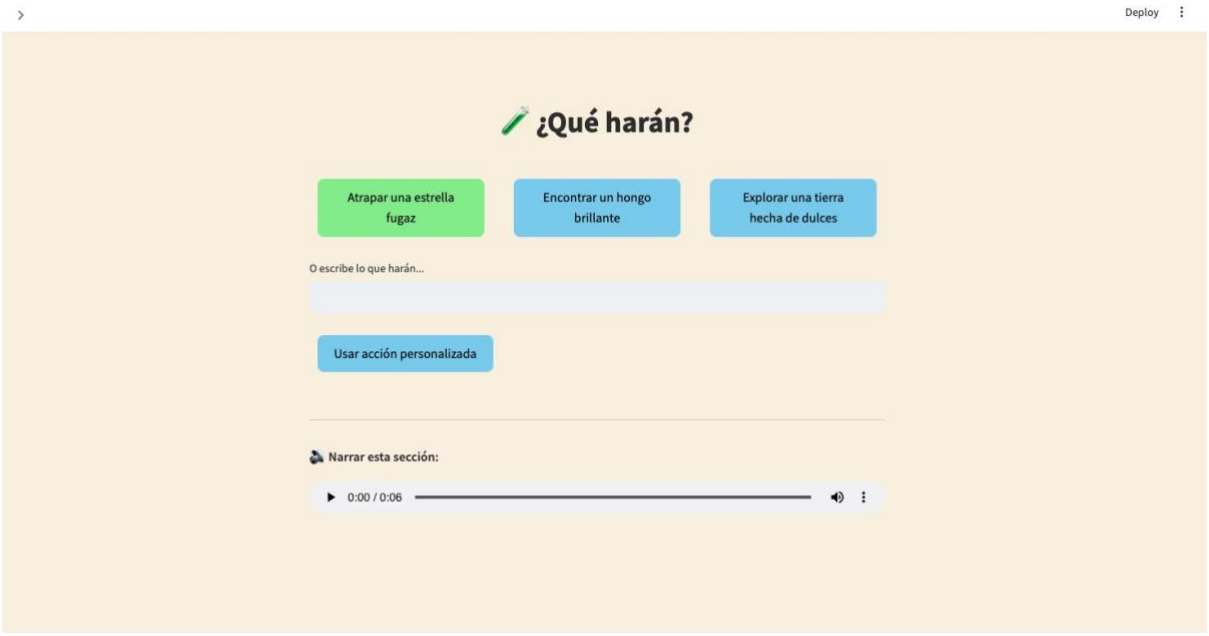


Figure 24.

On the second page, you can choose what the character will do. The three options are randomly chosen from a list provided in the code, to ensure a different suggested action each time a story is generated.

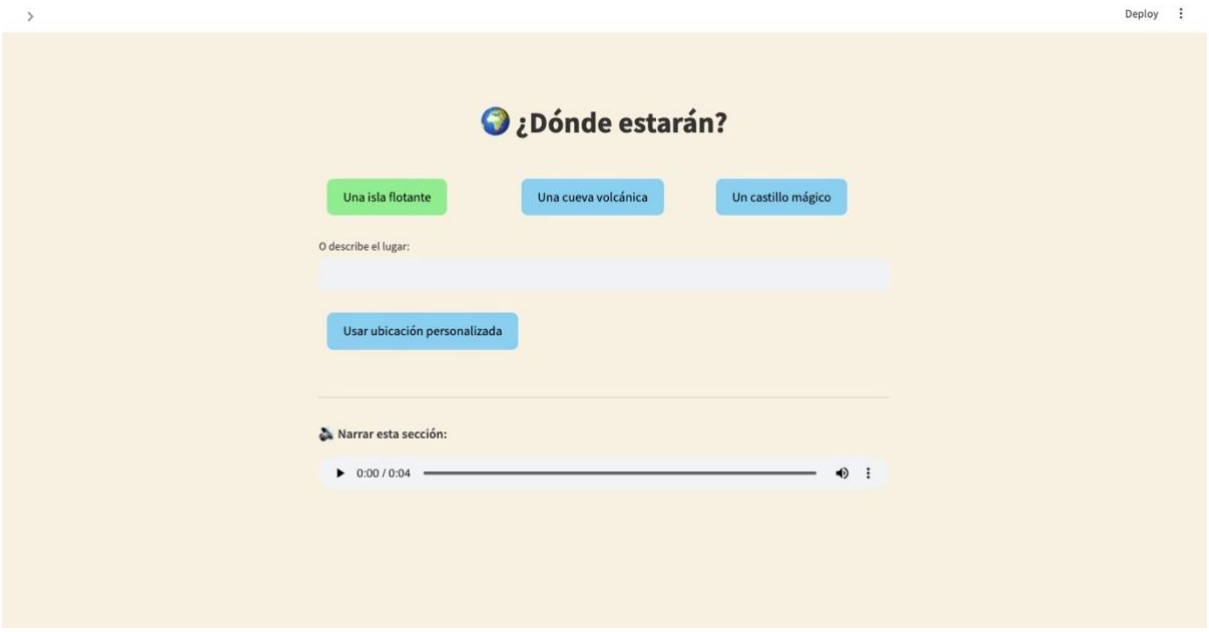


Figure 25.

On this third page you can choose where the action of the story will take place, and similarly as before the three options change with each play.

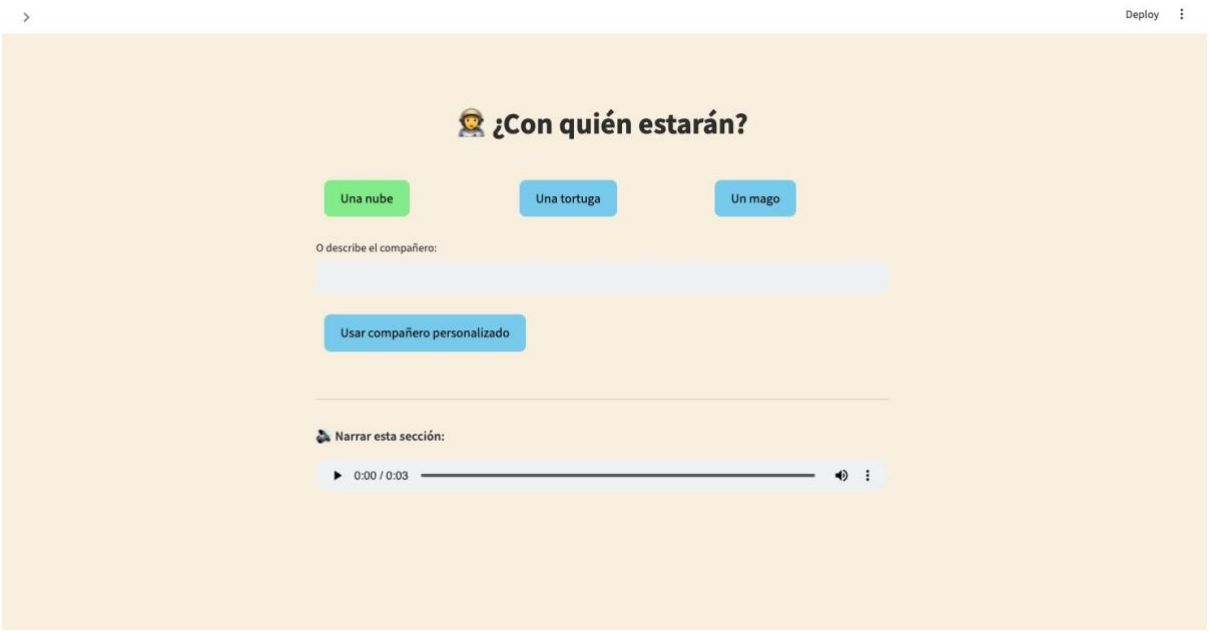

Figure 26.

On this page you can choose with who will the main character be with, again with the randomized suggestions as before.


Figure 27.

This is the loading page that shows up once you generate the story.

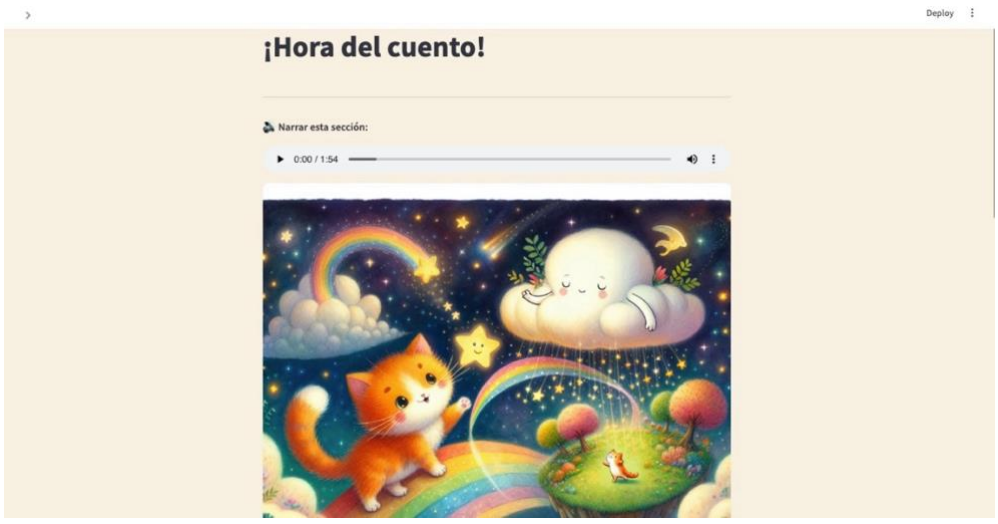

Figure 28.


Figure 29.

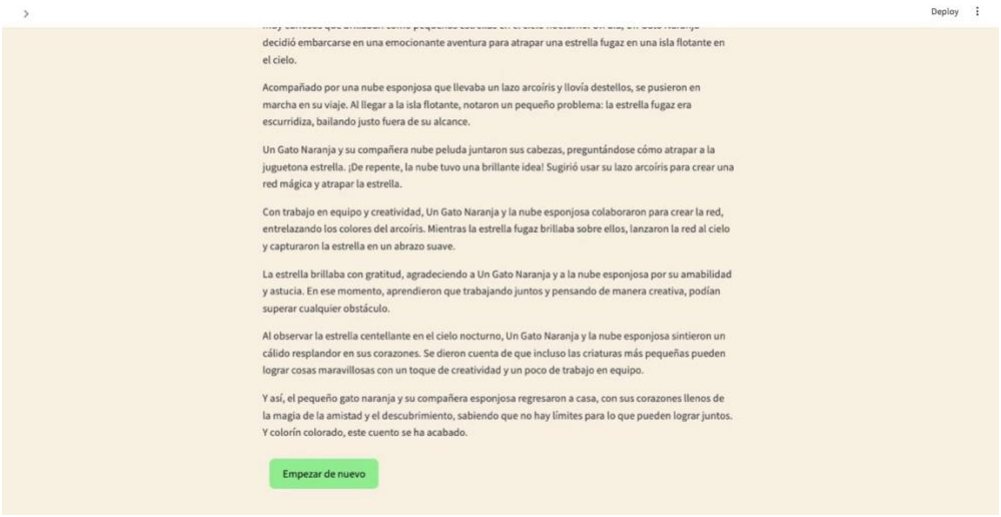


Figure 30.

These three images show the generated story on the last page with the audio and text version, as well as the image to accompany it. Finally, you can click the last button to create a new story and start the interaction again.

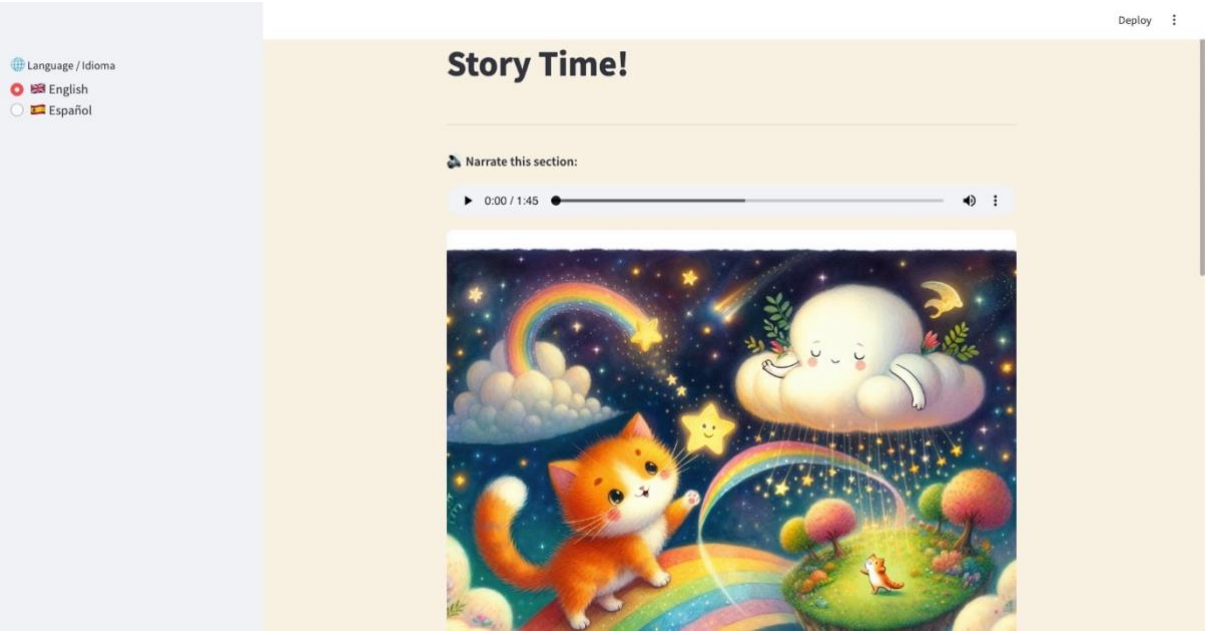


Figure 31.

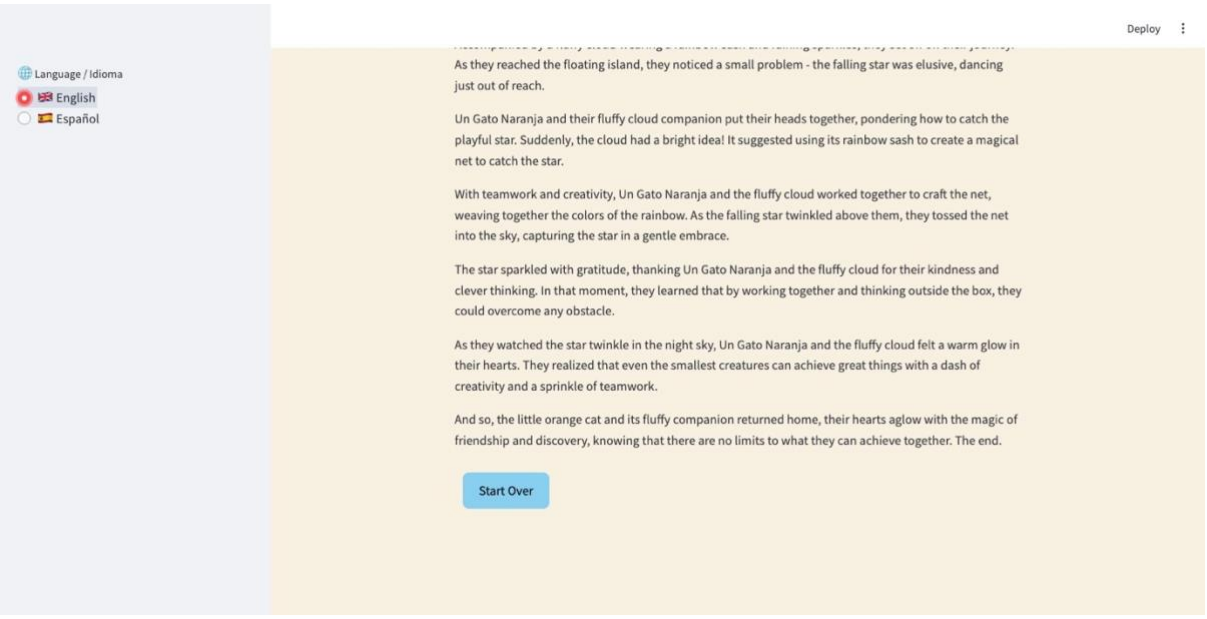


Figure 32.

These final two images display how you can change the page and audio language at any time, in this case showing the version in English.

## 3.2. User Testing

The user testing conducted was with 4 participants. 2 children: a 11-year-old girl we will call Stacy for privacy, and a 9-year-old boy we will call Denver. And 2 adults, who are former English language teachers living in Spain who we will call: Carmen, who is 60 years old and whose first language is Spanish, and Peter, who is 64 and whose first language is English.

The supporting material such as video recordings of the screens, their hand written suggestions form, audio recordings, and parent's authorization will be included in the annex at the end of this file.

## First test

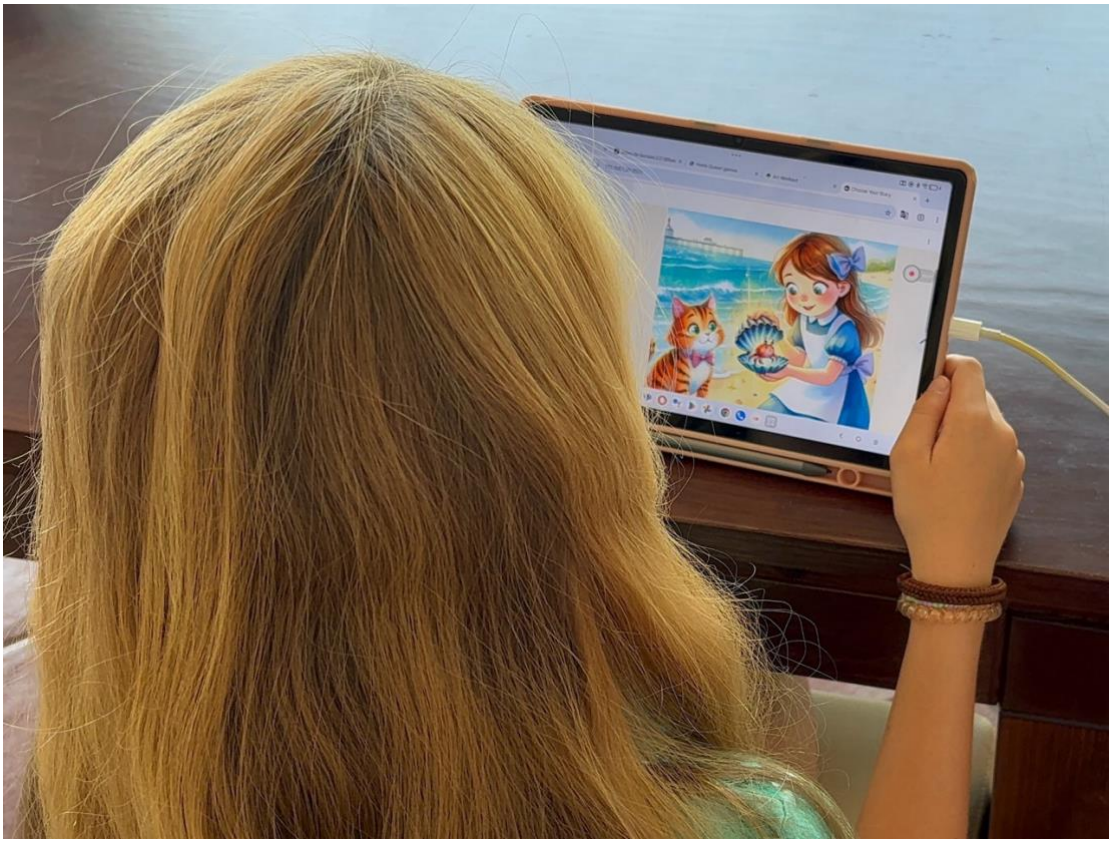

Figure 33.

The first test was conducted with Stacy. The test lasted 15 minutes and she generated 2 stories. She used her own tablet for it. First thing that was noticed was that no audio was listened to up until the final page where the story is generated, where listening to the audio was preferred over reading.

She preferred Spanish, as her main language and wasn't interested in exploring any English options, this was common among all participants to prefer their main language.

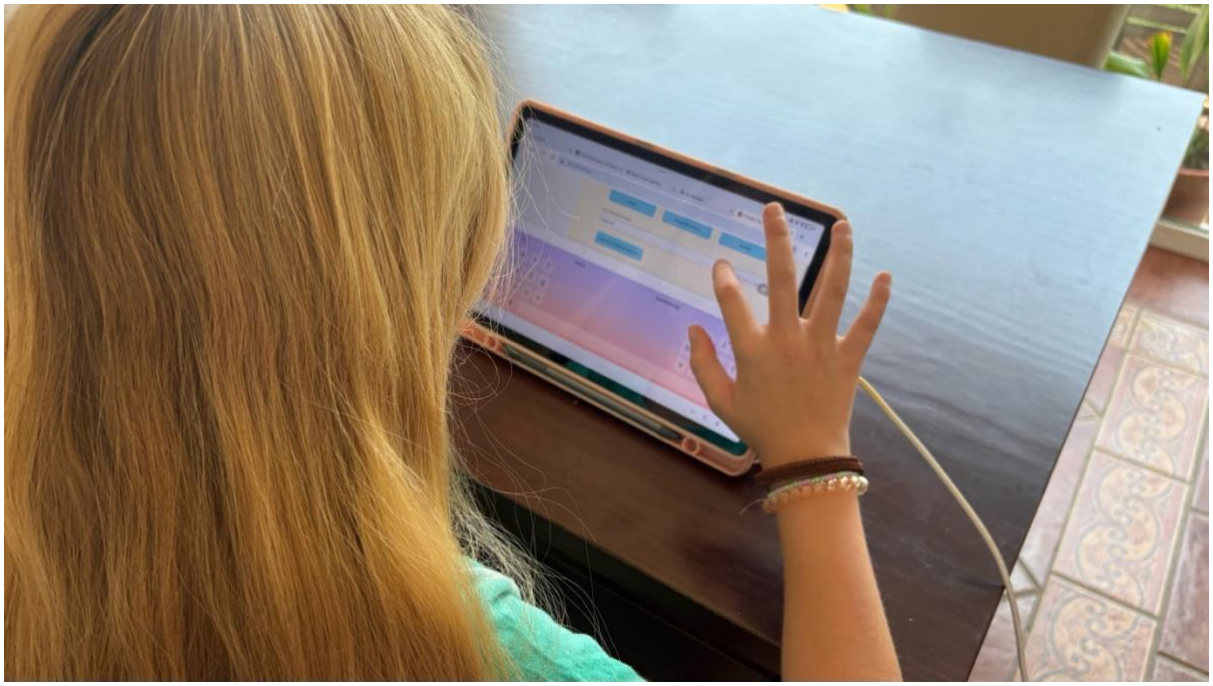

Figure 34.

On the first story generation, she chose all the suggested options, whilst on the second run she preferred introducing her own options. Once the story was generated with her options and read out loud, I noticed that she laughed, something that all participants did when hearing their introduced options be read out loud in the story for the first time.

Once asked, she listened to the story in English, and laughed at her options in the story being read out loud in English, such as character names or places.

Finally, I noticed that maybe the story was slightly too long as she seemed bored 3/4ths of the way through.

Figure 35.

After this test, Stacy was given a questionnaire form with some questions. She mentioned that the most fun part was creating her own story and seeing the

generated image of it because she was curious to see and hear what was created. When asked if she'd change anything, she mentioned wanting a more interesting design with more colours. She also mentioned that she would have loved the project more when she was between the ages of 3 to 6, which is when she enjoyed storytelling the most. She mentioned that she wouldn't add any more features as it already does everything she would find fun and entertaining.

**Second test**

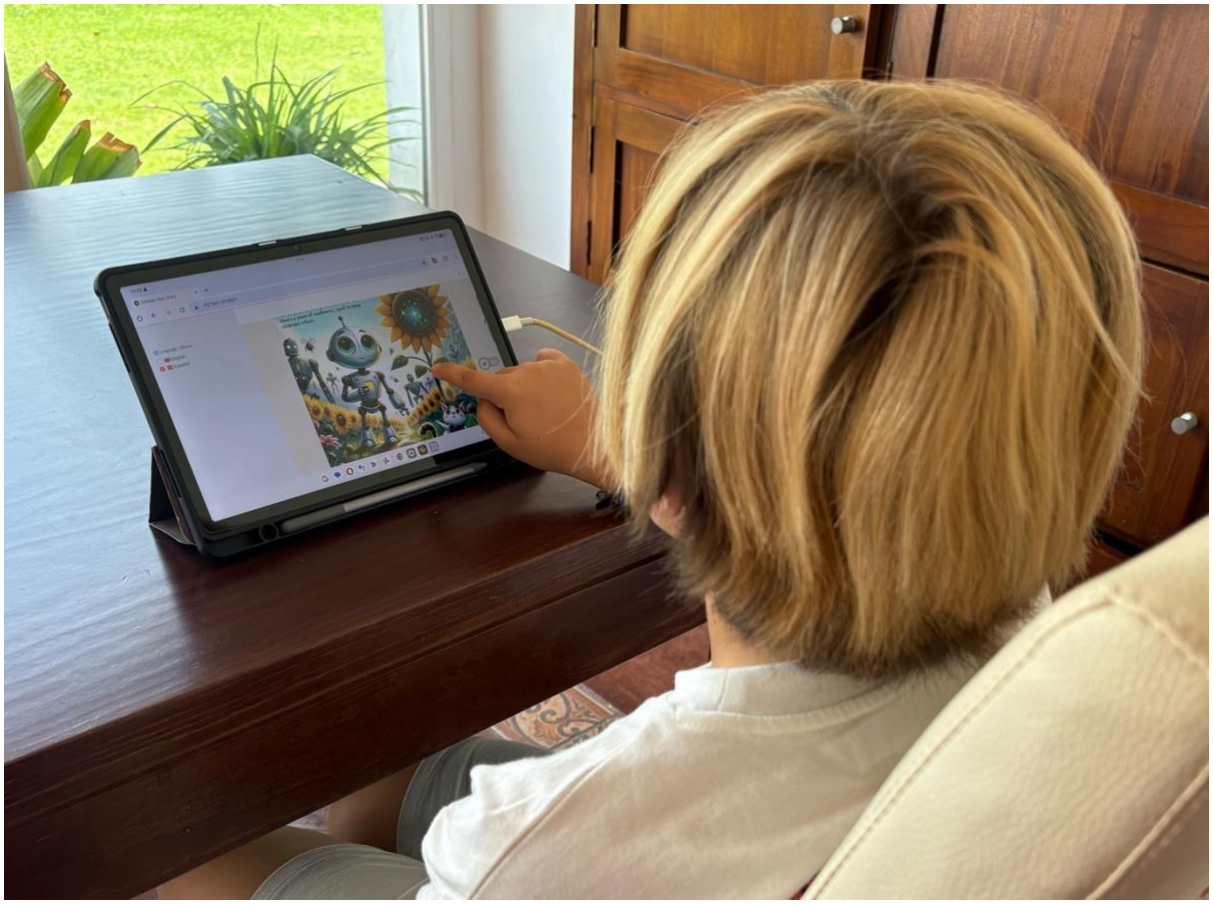

Figure 36.

The second test was conducted with 9 year old Denver, it lasted 15 minutes and he made 2 stories. He used his own tablet for it.

I noticed him not listening to audio feature until the final story page. Denver asked me a question about how it worked, whilst Stacy didn't. He asked how he could move to the next page. Denver preferred to introduce his own options from the first go.

Once the story was generated, he first pressed play on the audio and didn't scroll down to see the text. He also preferred Spanish over English and didn't explore the English version.


Figure 37.

Once the test finished Denver mentioned enjoying being able to create his own characters,

but didn’t enjoy how long it took to generate. He mentioned wanting more options and that the story could have different voices for each character.

## Third test

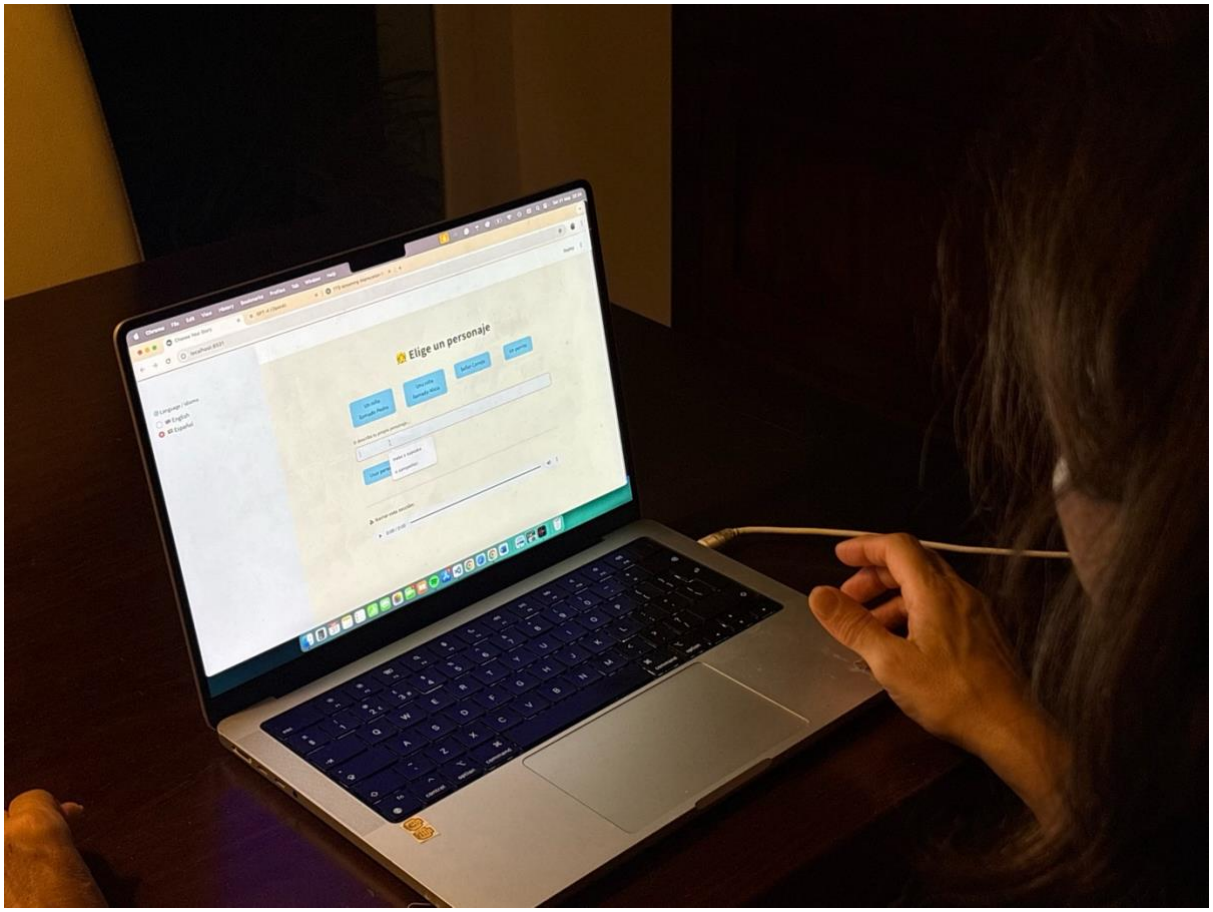


Figure 38.

The third test was with Carmen. Both Carmen and Peter's test was using a laptop as the project was giving issues on an iPad. It lasted 14 minutes and she made 2 stories.

Carmen seemed to enjoy the experience and smiled throughout. The first thing she said was how “cool” the idea was. She mentioned wanting more images generated at the end for each part of the story. She tried to remember previously introduced options when choosing the next one to make sure it made sense for her story.

She laughed with the generated image and story using her options. She struggled slightly with the small play button for the audio, which might be because she was using a mac instead of an Ipad which she mentioned she wasn’t used to. Generally, she said it was very cute and laughed a lot.

For her questionnaire, she mentioned that what she enjoyed most was how the image showed all the options she introduced for the story. She mentioned how she made a grammatical error and how it read that grammatical error out loud, but she found it funny.

She said that the stories were incredible and beautiful. She reiterated wanting more drawings at the end. She mentioned wanting images of each character and each suggested place to imagine them better.

She also mentioned wanting options for what type of story would be generated. Finally, she mentioned the little quirks of the stories made them interesting and funny.

## Fourth test


Figure 39.

Peter's test lasted 13 minutes. Peter seemed to really enjoy the experience, laughing throughout. He preferred making his own options. He mentioned he loved that the stories end on a lesson.

He noticed that it couldn't generate copyrighted images and that that would be fun to explore. He didn't have any issues with understanding how it worked but did prefer his native language and didn't explore Spanish.

For the written questionnaire, he mentioned enjoying being able to use characters from different worlds and make a story together. He mentioned that it would be fun to choose the style of the image, and maybe introduce different styles like a comic style or something more modern.

He also mentioned introducing one more options page where you could choose the tone of the story, like a mystery story for example, as well as being able to choose the level of the narration, if for adults, teenagers, or kids.

## 3.3. Satisfaction table marked by all users tested

| Question | A lot | Yes | A bit | Not much | Not at all |
|---|---|---|---|---|---|
| **Did you enjoy playing with the app?** | **2** | **2** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Did you find it easy to use?** | **3** | **1** | | | |
| **Would you use it again?** | **2** | **1** | **1** | | |
| **Did you like the characters and stories?** | **3** | **1** | | | |
| **Did you have fun creating your story?** | **3** | **1** | | | |
| **Did you like the drawing at the end?** | **2** | **2** | | | |

## 3.4. Heuristic table

| **Heuristic** | **Current status** | **Notes** |
|---|---|---|
| **Visibility of System Status** | Yes but needs clarification | Streamlit provides status on when the page is loading, and says when the story is generated, but could add explanation on how it will take 20-30 secs |
| **Match with Real World** | Good | Natural flow of language |
| **User Control and Freedom** | Good | User can input their own choices easily |

| | | |
|---|---|---|
| **Consistency and Standards** | Good | Is clear and consistent |
| **Error Prevention** | Some issues | Input validation could improve |
| **Recognition vs Recall** | Needs work | Might be good to add some aids |
| **Flexibility & Efficiency** | Good | Personalization options |
| **Aesthetic & Minimalism** | Too minimal | Kids enjoy more engaging designs |
| **Error Recognition & Recovery** | Missing | Errors show up as code errors |
| **Help & Documentation** | Missing | Might be best to include an initiall page with a brief explanation |

# 4. Conclusions and Improvements for version 2.0.

Other improvements like multiple images have been noted and moved on to version 3.0. These 4 improvements have been chosen to be incorporated now as they are the most impactful and plausible to include in version 2.0.

1. **Make Language Switching More Engaging**

All users stuck with their native language. Instead of just offering a toggle behind a tab, introduce it on each page.

2. **Add Story Complexity Options**

Some children lost interest before the story ended. Offer the option for the story's complexity based on demographic.

3. **Increase Customization & Creativity**

Everyone enjoyed the custom character and setting input. Build on this by adding a page to choose the story tone.

4. **Add initial page.**

With an explanation on how the app works to make easier to understand.

# 5. Final version and future work

This video shows the final version with the implemented features mentioned before. Designed for children and families, the web-based application was built using Streamlit, with GPT-3.5 Turbo for story generation and DALL·E-3 for image creation.

https://youtu.be/HC2IneN0Vo4

This version 2.0 of Beyond the Page marks a successful delivery of an interactive and generative storytelling prototype that aligns with the project's initial goals. Built using Streamlit and powered by GPT-3.5 and DALL·E-3, this web-based application allows children and adults to co-create stories with their input. The user can either pick from the randomized suggestions or write their own input. This prototype includes language-switching functionality between English and Spanish, a feature that could be extended to include more languages in the

future. The project also has story narration in both languages and personalized illustrations based on the story.

Version 2.0. was made using the feedback gathered from the user interviews: Language selection is now shown on each page to encourage bilingual exploration, instead of it being in a tab. Based on testing feedback, age levels were introduced to suit different age groups. A new feature was also implemented to allow children to select the tone of their story (e.g., mysterious, funny, or magical), to enhance creative freedom. This last feature came with having to create a nested dictionary with an explanation for each tone e.g.:

```
"Magical": {
        "en": "Use wonder-filled language, enchanting settings, and whimsical details that spark imagination.",
        "es": "Usa un lenguaje lleno de maravilla, escenarios encantadores y detalles mágicos que estimulen la imaginación."
    }
```

This allowed GPT to fully use the tone, as with just the word “Magical” for example, results proved to not have the tone in consideration when generating the story. Multiple versions of fine tuning the prompts were needed to make sure the story structure, tone, and character integration worked consistently. In terms of the image generation, attempts were made to ask it to not generate text in the images, but this made it generate more text as Dall-e sometimes struggles with negations. Future iterations would need some work on how to avoid text in the images, by experimenting with a different model.

Future versions might also include multiple images created for each story, as well as images for each option, but implementing this in this version would be too expensive for the current purpose.

The audio generation also used GPT, but for future iterations I would use Eleven Labs API, which has more natural options in multiple languages, and the ability to have different voices for different characters. Having different voices was suggested by one of the users and would add a layer of playfulness and engagement.

In terms of Language learning, there are ways to make it more engaging and more of a feature that promotes learning. The current setup works, but looking into educational principles on how children learn languages might help move forward towards implementing this feature in a way that helps children learn more seamlessly.

In terms of safe-guarding, a future iteration would need more filtering to make sure no unsafe text is introduced or generated. This includes implementing more robust bad-word filters, refining prompt construction, and exploring the use of fine-tuning techniques. Additionally, the integration of K–12 AI literacy principles will be essential to promote responsible and age-appropriate use of generative technologies in educational contexts.

In future iterations, it would be necessary to better the design elements of this project to give it a visually enticing look. This might include not using Streamlit but a CSS library. This could involve experimenting with colour palettes,

typography, micro-animations, or interactive visual feedback during the story-creation steps.

Finally, an onboarding screen was added to explain how the app works, which was chosen after doing the heuristic analysis. Future heuristic considerations to include in next versions are documentation, parent consent and clear guidelines on the use and risks of using GPT, and improve recall by introducing a small box where you can see your previous options.

This version of "*Beyond the Page*" demonstrates how the combination of generative AI with inclusive design principles could be used to create an educational, and joyful storytelling tool for children. The feedback gathered during testing has given insights for future improvements, paving the way for the project to evolve into a fully deployable product that bridges learning, language learning and imagination.

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# 7. Annex

Supporting materials, including signed authorization can be found on this link

https://drive.google.com/drive/folders/10uC3VNz35JNlk_1AS-1R7pG0FqoKSKVz?usp=sharing