

Title	A children's digital book designed for preschool kids : promoting a second language
Sub Title	
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Publisher	慶應義塾大学大学院メディアデザイン研究科
Publication year	2020
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2020年度メディアデザイン学 第813号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40001001-00002020-0813

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Master's Thesis
Academic Year 2020

A Children's Digital Book Designed for Preschool
Kids
Promoting a Second Language



Keio University
Graduate School of Media Design

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A Master's Thesis
submitted to Keio University Graduate School of Media Design
in partial fulfillment of the requirements for the degree of
Master of Media Design

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Abstract of Master's Thesis of Academic Year 2020

A Children's Digital Book Designed for Preschool Kids
Promoting a Second Language

Category: Design

Summary

Communication means the transmission of information. It is essential for any social group of creatures, whether human beings or nonhuman animals. It is well known that humans have a unique language system compared to those nonhuman animals. Nonhuman animals can make communications by some signs, for example, movements or sounds, but they do not have any complete, expressive language like humans do.

Today in 2020, humans have roughly 6,500 languages in total, of which 12 languages are the most commonly used. English is by far the most spoken language in the world, followed by Mandarin Chinese (Bus 2199a). In all the world's population, more than 43 percent of the people can use two or more languages fluently (Mul 2199b). With the impact of the internationalization process, it is believed that this number will increase. Therefore, it will be a general trend for children today to start a second language learning as early as possible. An increasing number of children are learning a second language before they enter primary school. In this paper, a digital children's book designed to help preschoolers learn a second language will be introduced and discussed.

Compared with adults, preschoolers have some difficulties in the learning process, such as lack of self-control and concentration, and are easily attracted by their surroundings. But on the bright side, children tend to be more curious and creative. Therefore, the digital children's book introduced in this paper will take advantage of the advantages of preschoolers, make the best use of children's curiosity about the world, fully mobilize children's learning enthusiasm, while avoiding the problem of impatience to affect children's learning. This digital children's

book will connect the real environment around children with what they need to learn through Augmented Reality (AR) Technology. It will also help children learn a second language while exploring the world around them.

In the process of using this digital children's book, children need to be accompanied and helped to learn by their parents – this will be an excellent opportunity to close the parent-child relationship. The book is expected to be considered exciting and easy to understand. Children are expected to accept and remember what they need to learn automatically. This research worked with prototypes. Parents and children would give their evaluations through questionnaires.

Keywords:

Second Language, Education, Preschool Children, Motivation, Innovation, Parental Relationship

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Acknowledgements

I am very grateful to my professor, Nanako Ishido sensei, who led me to develop an interest in children's education and learn more about the interest and importance of children's education. She made me realize that children's education is of considerable significance to a country and even the world. She also taught me that there are still many innovations in education that we can try.

I am very grateful to the seniors and fellow students in Digital Kids and Pop. I learned a lot from them, and they helped me realize that passion, love, persistence, and life planning are those very important things in life.

I am particularly grateful to my senior, Qi Yang, who gave me much help in developing Augment Reality functions and applications, enabling me to complete the prototype. She is also a good friend in my life and has brought me much happiness in my graduate years.

I am especially grateful to my classmate, Dalang Melati Z., who is a kind and talented girl. She is the designer who helped me redesign the characters in my prototype to make it more beautiful and better convey my concepts.

I am very grateful to the families who participated in my user tests, and for the trust they gave me.

Finally, I would like to give special thanks to my family and friends. Thank my parents for their support and friends from KMD community for the wonderful experiences in the graduate years. Thanks to Xiang Yu, who gave me understanding and comfort when I met confusion and frailness of life.

Chapter 1

Introduction

1.1. Preface

Globalization has become a significant issue nowadays. It is a word that we are increasingly hearing and familiar with today in the year 2020. It involves every aspect of people's lives, especially on the economic side. From the definition, globalization is the word used to describe the growing interdependence of the world's economies, cultures, and populations brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information (Glo 2199c). As the three major economies in the current global economy, the United States, Japan, and China will further participate in globalization.

With the impact of the globalization process, cultural exchange and integration are also inevitable. Today in 2020, humans have roughly 6,500 languages in total, of which 12 languages are the most commonly used. English is by far the most spoken language in the world, followed by Mandarin Chinese (Bus 2199a). As the most spoken language in the world, English serves as the lingua franca for education, trade, and employment. It is an essential skill for anyone who wants to succeed professionally or academically in the 21st century. An understanding of English and multilingualism is especially crucial in an age of increased and rapidly growing international migration (King 2199). English tends to be learned by more and more Japanese and Chinese people. For both Japanese and Chinese children, learning English from kindergarten onward is the order of the day.

In the meantime, more than 43 percent of the people can use two or more languages fluently (Mul 2199b). Therefore, it will be a general trend for children, not only children in Japan or China, but all the children today to start a second language learning as early as possible.

1.2. Research Background

The preschool education stage has a significant effect on children's second language learning. When promoting second language education, educators should not only respect mother tongue heritage and also avoid low spoken proficiency outcomes ¹. In this paper, the research background will be introduced from three aspects.

The first aspect is the popularization of learning a second language. As mentioned in the preface, more than 43 percent of the world's population is bilingual or multilingual (Mul 2199b). With the impact of the internationalization process, it is believed that the number of bilinguals or multilingual will increase. Therefore, as an educator, it is necessary to help preschool children to learn a second language as early as possible.

The second aspect is that traditional English learning methods and textbooks are out of date. The current English education is still based on traditional paper textbooks and classroom teaching. In the 21st century, more and more online English teaching courses have appeared. For preschoolers, education methods such as listening to music, watching animation, and playing games are added to the second language education in the classroom – but these education methods are more challenging to achieve through online courses or traditional children's digital books. Therefore, when designing children's digital books to learn a second language, increase interactivity is the purpose of this research. Secondly, the children's digital books we are familiar with do not focus on second language education. The function of most current children's digital books is like non-children's digital books, which aim to tell children an easy-to-understand and straightforward story. The children's digital books' main contents are humorous and engaging story content, easy to read and understand story text, and eye-catching illustrations ². Of course, these elements are necessary for high-quality children's digital books. However, besides those elements, in this research, Augment Reality technology will be used. It is widely seen that Augment Reality technology has been used in several industries in the world. For example, in the game industry, the game called "Pokemon Go" had attracted many enthusiasts from all over the world ³. That is why it is thought that using Augment Reality technology while designing a children's digital book is feasible. Many children's digital books nowadays that use Augment Reality technology are bundled with physical picture books. That

is, the details of the story appear in the physical picture books, and the Augment Reality children's digital books play a supporting role. In this research, a single children's digital book prototype will be used.

The third aspect is from the linguistic environment side. The linguistic environment has a significant influence on language acquisition. Both formal and informal linguistic environments affect language acquisition but in different aspects. The informal linguistic environment affects acquired competence, and formal environment affects learned competence (Krashen 1976). Even though both formal and informal linguistic environments contribute to second language proficiency, in children's second language education, informal linguistic environments play a more significant role. As Krashen (1981) pointed out, the child relies primarily on the acquisition. Thus, "intake" informal environments are sufficient (Krashen 1981). Therefore, in this research, a children's digital book was designed to create a linguistic environment dominated by listening and speaking. This children's digital book will focus on improving the children's chances of "intake" of the second language, helping children learn the second language in unintended and relatively relaxed situations.

1.2.1 English Education in Japan

Currently, English education in Japan has many problems. One serious problem is the poor communicative ability. From the results reflected by the TOEFL (Test of English as a Foreign Language) scores, Japan ranks close to the bottom among 29 Asian countries in English-language proficiency ⁴. As for speaking ability, Japan was at the bottom of the list. Until the end of 2019, Japan has not yet included English education in the formal primary school curriculum. Even with the new semester beginning in April 2020, English is officially included in the public primary school curriculum here is still a lot of controversy about this reform.

The main content of this reform is that In 2020, English will become a mandatory subject for fifth- and sixth-graders, instead of a "foreign language activity" class where children are only expected to experiment with English by speaking and listening (Eng 2199). That means that for primary school students before fifth grade, English still appears as a "foreign language activity", so the academic

formal linguistic environment cannot be guaranteed. Many students in Japan will increase their English study time by attending private schools or after-school tutoring classes. Outside the classroom, it would be expected if children's digital books could help them to learn English. For preschool children, the informal linguistic environment can be said to occupy most of the English language learning resources. This research hopes to contribute to this aspect.

1.2.2 English Education in China

For children born in Mainland China, English is the second language that they study most. For Chinese students, English is not their only choice for learning as a second language, but a small percentage of students will choose to learn languages other than English at their own expense. In the Chinese educational system, compulsory education lasts for nine years, including six years in primary school and three years in junior high school. Most schoolchildren experience their first English lesson in the second year of primary school, which means that children begin to receive formal mandatory English education from around seven years old ⁵. With the deepening of globalization today, more and more bilingual kindergartens and bilingual schools have appeared, and an increasing number of Chinese students have experience of English education from the preschool stage. However, for Chinese students, passing the English final exam is very important. Chinese English exams are more focused on reading and writing, so even if Chinese children have started English learning at an early age, they still tend to have poor communicative skills like listening and speaking. Therefore, it is also essential for Chinese preschool children to make full use of the informal linguistic environment around them to cultivate their sense of language and to practice listening and speaking.

1.3. Research Goal and Questions

The research goal in this paper is to figure out a method to help preschool children learn a second language as if learning their native language. A children's digital book was designed, and Augment Reality technology was used in this book. This research worked with a prototype of the children's digital book. The challenge of

this children's digital book was to create an informal linguistic environment for preschool children. It is essential to mention that this research will focus on the role of "intake" informal environment while learning a second language. This research cannot erase the importance of the academic formal linguistic environment in second language education.

In accordance with this research goal, the following research questions arise:

- Can this children's digital book create an informal language environment for children?
- Can children grasp what they are expected to learn?
- Did children and their parents get motivated when using this children's digital book?

Notes

- 1 <https://www.cambridgeenglish.org/Images/539682-perspectives-impact-on-multilingualism.pdf>
- 2 <http://www.childrensdigitalbooks.com/design/>
- 3 <https://blog.sprinklr.com/ja/the-future-of-augmented-reality-marketing/>
- 4 <https://www.japantimes.co.jp/opinion/2020/01/21/commentary/japan-commentary/japan-going-wrong-way-english-education-reform/#.XvFZHJMza00>
- 5 <https://jalt-publications.org/articles/24972-my-view-english-education-china>

Chapter 2

Literature Review

2.1. Linguistic Environments

The linguistic environment is a long-standing concept. There have been many studies on the influence of the linguistic environment on second language acquisition. In this chapter, paper and book written by Stephen D. Krashen, who has in-depth research on the linguistic environment, and has a profound introduction to the importance of the linguistic environment in his papers, will be mainly introduced.

In Krashen's book, *Second Language Acquisition and Second Language Learning*, mentions that the linguistic environment can be divided into two sorts: the formal linguistic environment and the informal language environment. The formal linguistic environment can also be called an artificial linguistic environment, which appears in the classroom, while the informal linguistic environment can also be called a natural linguistic environment. These two sorts of linguistic environments work differently during second language acquisition and learning. Krashen pointed out that informal environments, when they promote real language use (communication) are conducive to acquisition, while the formal environment has the potential for encouraging both acquisition and learning (Krashen 1981).

The positive effect and importance of linguistic environments, especially the informal linguistic environment, was also recognized by Krashen and other studies. In the book, Krashen concluded several studies in previous years that adults can not only increase their second language proficiency in informal environments but may do as well as or better than learners who have spent a comparable amount of time in formal situations. Of course, when exposed to an informal linguistic environment, the time spent in learning is also very important. A strong relationship was found between time spent abroad (in the country where the target language

was spoken) and test performance. A significant relationship was also found between test performance and the extent to which the target language was used in the students' home (Krashen 1981). However, in Krashen's study, the informal linguistic environment, which was confirmed with significant works, referred to the linguistic environment felt in the country where the language is spoken. In the non-native speaker families, whether an informal linguistic environment can be created, was not discussed by Krashen.

It should be pointed out that, Krashen's study targeted all second language learners, and did not specifically target preschool children. However, there are still many findings in his study that are consistent with the observations in the fieldwork. Krashen pointed out that informal linguistic environments can also be divided into two sorts: the "exposure environment" and the "intake environment". Learning a second language by "hearing a language" is insufficient. Languages learned in an informal linguistic environment need to be used continuously in order to be truly learned. In addition, learning only by an informal linguistic environment is not enough. The formal linguistic environment and "intake environment" that appears in the classroom is essential. However, since preschool children have not started to contact formal classroom education, the impact of informal language environment on them is much greater than on adults.

In addition to Krashen, some other scholars also mentioned the relationship between the linguistic environment in family and language acquisition. In the book *Japanese Children Raised in America* (アメリカで育つ日本の子どもたち), the authors pointed out that the linguistic environment in the family is crucial to language acquisition. If a Japanese child lives in a family that does not speak Japanese in daily life, his Japanese ability will be significantly reduced. Meanwhile, if a child lives in a family that uses both English and Japanese very often, his English and Japanese skills will be at a reasonable level. For language acquisition, continuous practice, and accumulation every day is essential (佐藤郡衛 2008a).

English education in the family also needs to follow certain rules of acquisition. For children just reached a new language, learning a second language is a process from "intake" to "release" (佐藤郡衛 2008b). The stages that children need to go through are as follows:

- The first stage: When the children first encounter a new language, they are entirely unable to understand.
- The second stage: After a lot of absorption and knowledge accumulation, the children can begin to understand what they have heard, but they cannot express themselves. This stage can also be called the silent period (沈黙期). The children are continually learning at this stage, but they cannot output yet.
- The third stage: After the children have studied for a period of time, they can start to express themselves in the language they have learned.

It can be seen from this learning process that the second language acquisition process is similar to learning the first language. It is necessary to continuously accumulate language knowledge in the process of daily listening and watching. When designing the children's digital book, it should be taken into consideration, dedicated to helping children accumulate language knowledge through the form of digital books, rather than just letting children remember the spelling of words.

2.2. Reference for Digital Books Design

When designing a children's digital book for learning a second language, a fundamental question is whether a native language is needed to appear in the digital book to help children with understanding. One argument is that when learning a second language, it is necessary to help understanding through the mother tongue. Another argument is that in the process of creating a linguistic environment, it is enough to show only the language that needs to be learned. In the book *Japanese Children Raised in America* (アメリカで育つ日本の子どもたち), the supports children need when learning a second language are mentioned. The authors believe that when learning a second language, children can be divided into two different situations. One situation is that children with relatively good English foundations have the continuous learning, and they can understand much content encountered in the learning process so they can learn without the mother tongue's assistance. Another situation is that for children who have no basic English knowledge when they read English picture books, the interpretation of the mother tongue is very

important. Without the assistance of the mother tongue, they may have difficulty reading by themselves (佐藤郡衛 2008c). Based on the above, when designing a children's digital book for learning a second language, whether it is necessary to add a mother tongue for explaining or parents need to guide children to use is a question to be considered.

The importance of parental guidance during second language learning is also mentioned in another book, *English Fantasy* (英語力幻想). In this book, the author describes some current existing English picture books. The combination of English education and picture books is of considerable significance to children's English learning. It can help children to increase the experience of English learning under the stimulation of vibrant colors and graphics, and in the repeated sounds. However, a problem that often arises is that English picture books often have some complicated content, making it difficult for children to understand the content of picture books. As mentioned by the author in the book, it is easier for adults to understand English content than children with the images in picture books and CD. Therefore, it is feasible for children to learn English through picture books with their parents' help. When designing a children's digital book, consideration will also be given to asking parents for guidance while reducing the assistance of the mother tongue (強 2004).

Some other books mentioned precautions about second language education, which can be used for reference when designing this children's digital book. In the book *Languages and Cultures Education of Multilingual Society* (多言語社会の言語文化教育), a theory called Dual Path Theory (二重経路説) is mentioned. This concept can be understood as that people can learn language through two paths, one is the path of sound, and the other is the path of graphics. That is to say, by often listening to English and reading English text shapes, it can also help children learn English (裕子 2003). Therefore, in the process of designing the children's digital book, images and audio are critical components.

Chapter 3

Fieldwork

3.1. Two-day Fieldwork in English Institution

To better understand preschool children's current English education, I conducted two-day fieldwork in an educational institution. It is an educational institution located in China. Its main business is English courses designed for K-12 students (students from kindergarten to twelfth grade). The age range of students in this institution ranges from preschool children to high school graduates, which means that students aged 4-18 can find suitable courses for them. This institution has a good reputation in China and more than 50 campuses. During the two-day fieldwork, I spent most of my time listening to preschool children's courses, so the children I communicated with at this opportunity were between 3-6 years old. In these two days, my main study content was divided into two parts: observation of teachers, and the other was the observation of students. In addition to the observations, I also conducted interviews with English teachers and students' parents.

3.1.1 Course Flow

What surprised me was that there are two different curriculum types in this institution that are both designed for preschool children aged 3-6. One is a single lesson with 40 minutes of class time, and the other is two consecutive lessons with 40 minutes each and a 10-minute break between classes. I was curious about these two types of curriculum: Are both curriculum acceptable to preschoolers? Will children feel tired or bored during long classes? How to avoid these problems when designing the curriculum? How effectively does the teaching work? With these questions, I recorded the respective processes of the two types of curriculum.



Figure 3.1 Fieldwork – Vocabulary Learning

Curriculum 1

Time Allocation	Class Contents	Children's Reactions
0-10 min	Playing Language Games / Dance	Enjoyed
10-30 min	Review Vocabulary and Sentences	Getting Tired From 20 Minutes
30-40 min	Learn New Vocabulary and Sentences	Need to Reawaken Attention

Table 3.1 Course Flow of Curriculum 1

From the first type of curriculum, it could be found that children enjoyed a combination of studying and playing. In the first ten minutes of class, the teacher took the children to dance with English songs or play English games. The children's interest was quickly aroused, and they enjoyed the activity very much. One or two of the ten children in the class were shy and not very good at dancing, but

the teaching model did not repel them. Following the guidance of the teacher, all the children could participate. Secondly, children need to spend a lot of time reviewing what they have learned before. They took about 20 minutes for review, which took up more than half of the class time. From the interview with teachers, I got that children learn English quickly but forget it quickly, so they need to repeat it over and over again. After 20 minutes, the children begin to feel tired and out of control. The children started to lose their concentration, so the teacher started to spend time keeping order. The last 10 minutes of the class was about learning new things, but the contents were not much. The teacher played animation and audio to get the children to read after it. In the interview with teachers, the teacher told that the process of learning new content is mainly to let the children have an impression of the knowledge, but not to expect them to do memories of everything entirely ¹.

Curriculum 2

Time Allocation	Class Contents	Children's Reactions
0-10 min	Playing Language Games / Dance	Enjoyed
10-30 min	Review Vocabulary and Sentences	Getting Unfocused and Tired From 20 Minutes
30-40 min	Speaking Practice	Attention Reawakened
Break For 10 Minutes		
0-10 min	Speaking Practice / Language Games	Focused
10-25 min	Learn New Vocabulary and Sentences	Getting Unfocused and Tired From 20 Minutes
25-40 min	Watch English Animation / Dance	Enjoyed

Table 3.2 Course Flow of Curriculum 2

The second type of curriculum has something in common with the first type. At the beginning of the class, both curricula began by playing games and danc-

ing. That was because, through games and dances, children's interest in English learning could be aroused, and their resistance to class could be reduced. Besides, as children in kindergarten were more dependent on their parents and did not want their parents to leave, playing games and dancing could attract children's attention and make them forget the sad feelings when their parents left the classroom.

In both curricula, revision took up a lot of time. For the same reason as previously mentioned, children needed constant repetition to impress them with words and sentences. However, unlike the first type of curriculum, because the second type of curriculum had longer class time, a period of speaking practice was added, which was a valuable time for children. Because children began to lose concentration from around the twentieth minute of learning, allowing them to speak out can reawaken their attention.

The second curriculum had a 10-minute break in between. But for preschoolers, a 10-minute break was not enough to fully recharge their energy, making it harder for them to concentrate during the second class than the first one. Therefore, the second class began with speaking practice. As children practiced speaking, they became more focused. It was worth noting that their surroundings easily attracted kindergarten children, so toys need to be kept away from them during class.

After the speaking practice, there would be about 10 minutes to learn new knowledge. As mentioned before, children were only required to have an impression of the new knowledge because it would be repeated later in further classes. After the two classes, children became very tired. At the end of the second class, they would end up watching English animation, which was also a way that let children relax in the English linguistic environment.

3.2. Fieldwork Findings

This fieldwork has a significant value. The findings of the observations are consistent with what appears in the literature review.

First of all, children prefer the educational model that combines playing and learning. Most preschoolers are very lively and active. They are full of curiosity



Figure 3.2 Fieldwork – Use Digital Teaching Materials

about the world and are always attracted by their surroundings. Therefore, educators can try teaching outside or incorporating educational contents into toys or other things that children are exposed to daily. Besides, boys tend to be more likely to exercise than girls, so teaching activities can also be combined with sports. Almost all the children have the experience that is too shy to open their mouths to answer questions in class. Dancing, sports, or playing games can also solve this problem.

Secondly, it is difficult for children to keep their attention for a long time. People's learning ability can be gradually improved during the process of continuous learning. But for preschoolers, their attention span is usually only 15 to 20 minutes. The study longer than 20 minutes can make children tired. They will lose their concentration and want to talk to their partners or play with toys, so the class longer than 20 minutes may reduce learning efficiency. Therefore, unsystematic learning after class is particularly essential for preschool children.

Thirdly, children have an outstanding ability to understand. When learning a language, especially when listening and speaking, they do not need to be given

a detailed definition of grammar. Appropriate body language and examples can help children understand the meaning of the sentences. Therefore, the design of the scene is very important when designing the contents of the textbook. A complete scene may help children understand the meaning of the material.

Notes

- 1 Refer to the Appendix for the full interview with English teachers.

Chapter 4

Design Process

4.1. Design Proposal

As mentioned in the introduction, the research goal of this study is to figure out a method to help preschool children learn a second language as if absorbing the mother tongue. The literature review and fieldwork show that an informal linguistic environment at home can help children a lot while learning a second language. In addition, children prefer the educational method that combines playing and learning. Thus, two design proposals are set to archive the research goal.

The first proposal is to create a linguistic environment dominated by listening and speaking. At present, children lack the after-class informal linguistic environment because parents and children do not speak English at home. If children go back home after class and do not have a chance to speak English, they will soon forget what they have learned. Even if the children have acquired some words and sentences, they have no opportunity to use it. This children's digital book will attempt to change this situation by letting the children read and speak while reading the children's digital book under the guidance of their parents and allowing them to speak out with their parents at home. Since this children's digital book is designed for preschool children, it should not have too much text for reading, nor require any memory.

The second proposal is to let users combine the knowledge they have learned from the book and the surroundings in reality by using the latest technologies, for example, the Augment Reality technology in this study. Since it is difficult to simulate a scene only through picture books, the children's digital book designed in this study will connect with the scenes from real life. A series of children's

digital books can connect with different life scenes, such as schools, hospitals, parks, zoos, etc. The scenes that preschool children most often reach in real life will be chosen in order to increase the frequency of usage.

This research worked with a prototype of the children's digital book. Children whose mother tongue is Chinese or Japanese tried to learn English using this prototype of the children's digital book. Children from 3 years old to 6 years old were invited to try this children's digital book with their parents' guidance and companionship.

4.2. Design Preparation

When designing this children's digital book, many related designs need to be completed at an early stage. The first stage is the choice of background. As this digital book is expected to combine the book contents with the scenes that children are exposed to in real life, I chose the "zoo" scene as the background in this study. Parks, zoos, and aquariums are places where parents are happy to take their preschool children to visit. At these places, parents can let the children play happily and let them learn about their surroundings. Children are full of curiosity about the world. They are very desire to know about their surroundings, like a fish, a plant, or an animal. Also, children usually say their first words at around 12 months, and they begin to pick up increasing numbers of words and start to combine them into simple sentences after about 18 months (Con 2199d). Therefore, for children around three years old, it is feasible and exciting for them to begin to understand how things around them could be spoken in another language. For example, it is viable and exciting for them to learn how animals in the zoo could be spoken in English or how to greet their friends in English.

Following, I chose Ueno Zoo as the background location for this children's digital book. As the oldest zoo in Japan, Ueno Zoo is divided into 63 main sections with animals and birds from around the globe ¹. Ueno Zoo is located in Ueno, Tokyo, where the transportation is very convenient. Ueno Zoo is the place very suitable for parents and children to visit together during the holidays. I hope that when parents take their children to Ueno Zoo, they can take this children's digital book with them – to find the animals mentioned in the digital book while they are

visiting, and learn English words about animals. Of course, there will also be some simple dialogues in the digital book. To better understand the layout of Ueno Zoo, I prepared a map of Ueno Zoo (Figure 4.2), from which we can see the animals that children are expected to learn.



Figure 4.1 Map of Ueno Zoo

4.3. Prototype 1

4.3.1 Design

After selecting Ueno Zoo as the background location, the first version of the prototype was designed. The propose of creating the prototype is to test whether this type of children's digital book is likely to be accepted by target users, who are children aged 3 to 6 and their parents.

The highlight characteristic of this design is the extensive use of Augment Reality technology, so parents and children are suggested to take the book with them while visiting Ueno Zoo. After stepping through the entrance of Ueno Zoo, users

will see an Augment Reality interface, and a piece of animation will appear to show some dialogues to learn (Figure 4.2).



Figure 4.2 Entry Animation

Also, an audio of the dialogues will be played so that children can follow to read (Figure 4.3).

Once children get inside the zoo, a map of Ueno Zoo will be shown to them with the kinds of animals waiting to be found. Since there are more than hundreds of animals in Ueno Zoo, only ten animals will be marked in the children's digital book. Children need to follow the map to find the corresponding animals, scan the image of the animals on the introduction board. Then the digital picture book will show the relevant English words and animated images to users (Figure 4.4) (Figure 4.5).

The book also has quick quizzes at the end of the chapter. After completing all the study tasks in Ueno Zoo, children will get check-marks of all the animals, as well as a stamp of "Zoos Passport" (Figure 4.6). Children are supposed to learn ten English words of animals and the dialogues of greetings after this trip of Ueno Zoo. Then they can move to another digital book in this series, which could be



Figure 4.3 Practice Audio

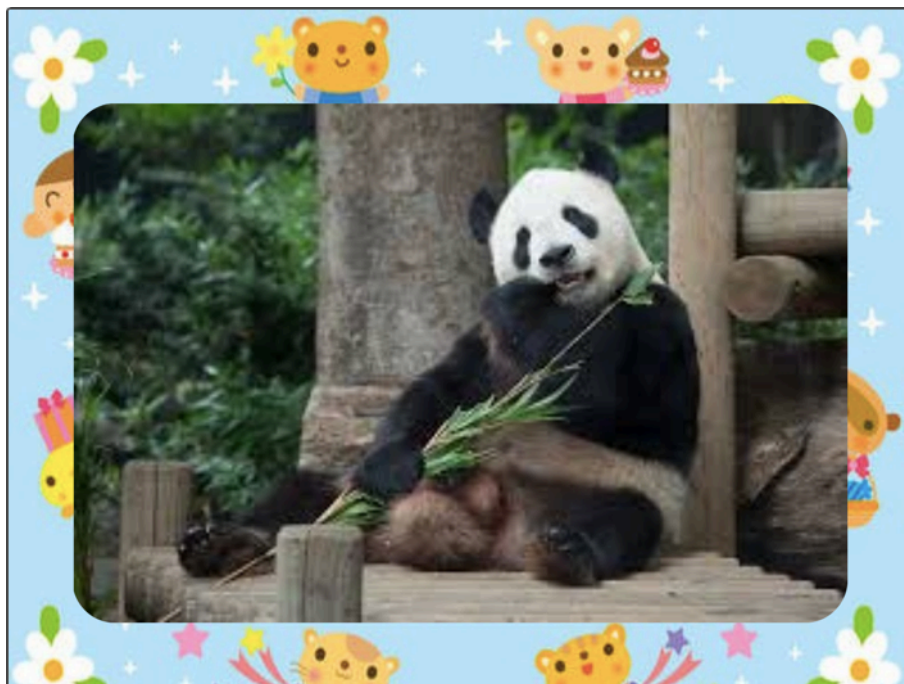


Figure 4.4 Scan the Image of Animals



Figure 4.5 Pronunciation of the Words

about another park or aquarium, allowing children to learn new English words and sentences while visiting another park or aquarium.

It is worth to mention that as a children's digital book, this design is not supposed to be used outdoors only. This children's digital book will also contain features similar to other regular digital books, such as traditional texts and illustrations, in case that children cannot bring this book outdoors. When children cannot visit a zoo or a park, they can still read it like a regular digital picture book.

4.3.2 Evaluation and Findings

Since this children's digital book was designed for children to use with their parents while visiting the zoo, it was distributed as a mobile application and sent to the people who attended the user test. A video was also sent to them explaining the application method to give participants a better idea of how to use the digital book. Parents could take their children to the zoo whenever they like and try to

Do You Think This Book Brings You Pleasure?				
NO, VERY BORING	NO, I DON'T WANT TO USE IT	MODERATE	YES, I WILL USE IT	YES, VERY INTERESTING
0	0	5	6	4

Table 4.1 Do You Think This Book Brings You Pleasure?

How Easy Do You Think This Book Is To Use?				
VERY HARD	HARD	MODERATE	EASY	VERY EASY
0	1	6	5	4

Table 4.2 How Easy Do You Think This Book Is To Use?

Question about how often users expect to use this digital book met with relatively scattered responses. Of the 16 respondents, three said they would consider using this digital book only once a quarter, five said they would use it about once a month, and five said they would want to read it about once a week. Since this digital book tends to be used when parents take their children to the zoo, its frequency of use may be related to how often parents want to take their children out. Some parents said they do not take their children to the zoo very often, so they might not use this digital book frequently. Still, three respondents said they probably read the book more than three times a week. In addition to the Augment Reality function, parents are looking forward to adding story contents to the book so that it can be read without leaving the house.

How Often Do You Think You Will Use This Book?				
ONCE A YEAR or LESS	ONCE A QUARTER	ONCE A MONTH	ONCE A WEEK	THREE TIMES or MORE
0	3	5	5	3

Table 4.3 How Often Do You Think You Will Use This Book?

In general, this digital book got relevantly good feedback from candidates. Half of the respondents said they might suggest this digital book to their friends. Meanwhile, four of the respondents said they like this book and they would suggest it for sure. The remaining four respondents said they love it.

Will You Suggest This Book To Your Friends?				
NO, I DON'T LIKE IT	PROBABLY NOT	MAYBE	YES, I WILL	YES, I LOVE IT
0	0	8	4	4

Table 4.4 Will You Suggest This Book To Your Friends?

From this user test, the first prototype of this digital book gained recognition from most candidates. The survey also asked participants for their suggestions for improvements, and fortunately, parents offered plenty of suggestions. Besides adding story-telling contents and illustrations to this book, parents also wanted to add voice and interactive features. Parents also hope this children's digital book work with public institutions such as schools or libraries to make the book more widely available. The second version of the prototype was designed on candidates' advice.

4.4. Prototype 2

4.4.1 Design

After analyzing the requirements and suggestions put forward by the participants in the first user test, a new design for the contents of this digital book was made, and some new functions were added to it, completing a relatively comprehensive prototype than the first one. Firstly, the logo and characters in this digital book were redesigned. As stated in previous chapters, this digital book's design concept had the premise of conveying to children a feeling that they can learn English happily and increase their enthusiasm and confidence in learning.

In the newly designed prototype, the forest image was selected as the background design of the entire digital book. Children all know that animals come

from the forest. The book's background is a big family living in the forest, and the animals live happily together. The logo and characters were redesigned with the help of a professional designer Darang Melati Z. The design of the logo follows the style of the zoo and the forest. Since the story is set at Ueno Zoo in Tokyo, the logo has specially added Japanese elements (Figure 4.7). The design of animals' images is based on basic circles, squares, and triangles, making these animal images distinctive and straightforward, and easy to recognize. The round animal figures are adorable and increase children's affinity for them.



Figure 4.7 Logo

Ten of the animals that appear in Ueno Zoo were chosen to be the protagonists of this children's digital book (Figure 4.8). During the children's trip to Ueno Zoo, they have to find out the ten animals, learn how to say them in English, and the children also need to learn some other English words associated with those animals. The ten animals are Panda, Polar Bear, Penguin, Kangaroo, Elephant, Deer, Seals, Rabbit, Giraffe, and Tortoise. In addition to the vocabulary of ani-

imals, some simple adjectives and nouns suitable for children's learning were also selected for this digital book. These adjectives and nouns are related to the ten animals to help children understand the meaning of the vocabulary better. These selected words are shown below:

- Panda - Black and White - Eyes
- Polar Bear - White
- Penguin - Cold
- Kangaroo - Jump
- Elephant - Long - Nose
- Deer - Horns
- Seals - Swim
- Rabbit - Ears
- Giraffe - Neck
- Tortoise - Hard - Shell



Figure 4.8 Ten Animals in the Book

4.4.2 Improvements from Prototype 1 to 2

After the design of the logo and characters completed, compared with the previous version of the prototype, the most significant improvement of the new design is in the Augment Reality function of this digital book. A map of Ueno Zoo, which exists in real life, will appear in the children's digital book as a catalog. Children can use this map to find the location of the animals they are looking for and find them (Figure 4.9). Children can use the digital book's camera to scan images of animals on the map, and the digital book displays an animation showing them how to call the animal in English. Similarly, if the children find the location of the appropriate animal in the zoo and scan a picture of the animal from the instruction board with the digital book's camera, an animation will appear containing adjectives or nouns that the children are expected to learn. To better explain children's process using this digital book once they enter the zoo, please refer to the flow chart below (Figure 4.10).



Figure 4.9 Map of Ueno Zoo shown in the Digital Book

Of course, this children's digital book is not only designed for outdoor use. There are times when parents cannot take their children to the zoo, and they have to stay at home, they can certainly use this digital book. When making this prototype, the images that children need to scan were selected and bound into an ordinary paperback picture book. When parents want to learn English

at home with their children, they only need to scan the images in the paperback picture book with the digital book's camera, and they can also see animations for teaching. The animation also includes images and sounds which can perform similar functions to other digital books. Parents and children can choose where they use this children's digital book, indoors or outdoors. This digital book allows children to reach English by watching and listening.

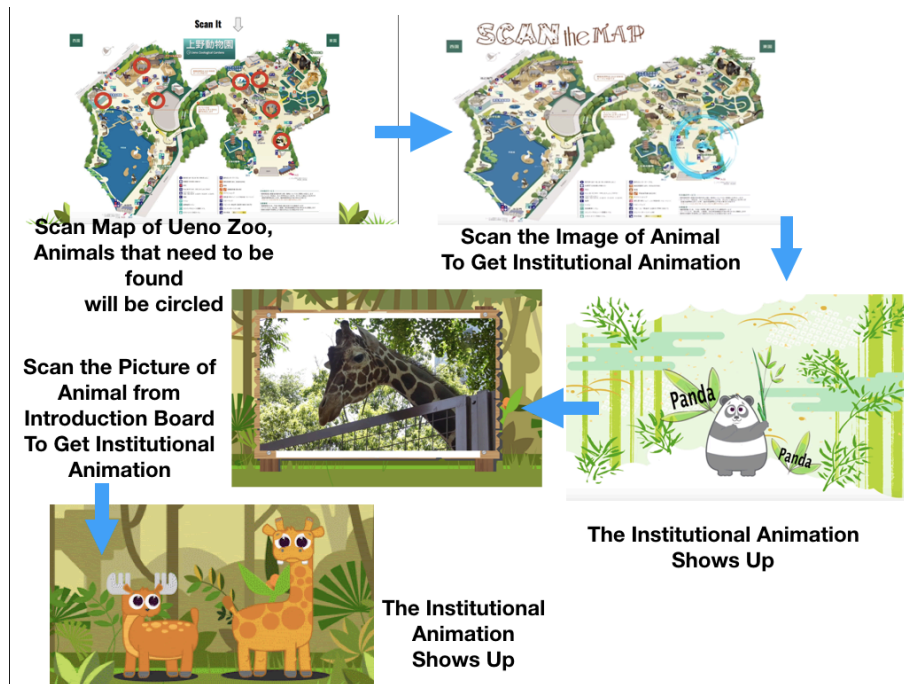


Figure 4.10 Usage Instruction of the Book

Notes

- 1 <https://www.japanvisitor.com/tokyo/tokyo-zoo>
- 2 Refer to Appendix for full Survey.

Chapter 5

Proof of Concept

5.1. Validation Criteria

As mentioned in the previous chapters, this children’s digital book is designed to expose children to English learning from preschool age. This digital book aims to provide a relaxing environment for children to learn English while playing, and to make them feel that learning English can be fun and playful. This digital book aims to create an informal linguistic environment where children listen and speak so that parents can guide their children’s English learning even in non-English speaking families. In using the book, it is expected that children would learn English without having to memorize. Therefore, the validation criteria will include the following aspects:

- Do parents and children find the book interesting?
- Do children enjoy the learning process?
- How much English knowledge can a child learn after using it for one time?

In all three of these aspects, the number of English words a child can learn can be directly tested. The other two aspects, namely the feeling of using this book and the feeling of learning English, are relatively subjective issues, so we need a more comprehensive evaluation method. In this user test, the primary way to collect users’ evaluation is to collect questionnaires. It was also expected that parents to write relatively detailed feedback. Also, parents were encouraged but not required to record videos of their children’s learning to help visually observe how their children react during the learning process.

Target Group

The user test is aimed at preschoolers aged 3 to 6 and their parents. The user test is not limited to families in Japan or China. As long as the family does not use English in daily life, they can participate in the user test. Some of the families taking the test are in non-English speaking countries in Africa or Europe, and parents who are not native English speakers also want their children to be exposed to English learning through this children's digital book.

Test Environment

The children's digital book was sent to parents as a mobile application, and the paperback picture book associated with the digital book was also sent to parents in PDF form. Parents could choose to take this children's digital book with their children to the zoo or use it at home. In this prototype, the English vocabulary was not very many, so parents and children were expected to read and learn all the contents in one use. After all the study, the parents were asked to complete the questionnaire. Parents could also send in relatively detailed descriptions of the learning process. If they were willing to, parents could also take videos of their children's learning process. During the entire user test, families could be communicated via the Internet. Parents and their children could complete the test at any time they like.

5.2. User Tests

Test Preparation

The prototype of this children's digital book contained contents as animal images, English words to learn, animation, pronunciation audios, a map of Ueno Zoo, as well as a paperback picture book that contained all the animal images to be scanned. If participants wanted to bring this children's digital book with them during a trip of Ueno Zoo, they would need to bring the book, and they could also bring the map or pick the map at the zoo's entrance. If participants wanted to use this children's digital book at home, they could scan the images in the paperback picture book and watch the animation for learning in comfort at home.

English Contents

Although ten animals and related words were selected in the design of this children's digital book, there were only fifteen nouns and adjectives in total that appeared in this version of the prototype used in this user test. The children who took the user test only had to measure how many words they could get out of the fifteen words in a single-use. The words in this version of the prototype are essential words suitable for preschool children to learn. These words are as follows:

- Panda
- Polar bear - White
- Elephant - Nose
- Giraffe - Long - Neck
- Seal - Swim
- Kangaroo - Jump
- Tortoise - Hard - Shell

5.2.1 Users Feedback

During this user test, parents who participated were required to complete a questionnaire after using the children's digital book for only one time. Parents needed to observe their children's reactions and feelings while using the digital book. Parents were also required to help children review and give the children a short quiz to recall how many words their children learned after the one-use. Children could also answer questions by themselves if they would like. There were eight families in total joined the user test and gave their feedback. Two of the questionnaire was given back by children themselves who tried the prototype ¹.

The first question tested how easy was the prototype to be used. This question was on a scale of 1 to 5, the answer one was shallow, and answer five was very high. The scale meant that answer one was very hard to use, and answer five as

very easy to use. Seven of the eight answers rated the scale as five, and one rated it as four. Therefore, almost all the participants thought this digital book was very easy to use.

Do You Understand How To Use This Book?				
SCALE 1	SCALE 2	SCALE 3	SCALE 4	SCALE 5
0	0	0	1	7

Table 5.1 Do You Understand How To Use This Book?

The second question tested whether this children's digital book was fun and whether it brought negative emotions. If the book's content made children feel bored or difficult, it might affect their motivation to continue learning. This question was also on a scale of 1-5. Answer one meant one could not use it until the end, and answer five meant one could play it to the end without any hesitation. In response to this question, five participants said they could use it to the end with no hesitation, and three gave the answer on a scale of four, meaning they faced few hesitations, but they moved to the end easily.

Were You Able To Play It Until The End Without Any Hesitation?				
SCALE 1	SCALE 2	SCALE 3	SCALE 4	SCALE 5
0	0	0	3	5

Table 5.2 Were You Able To Play It Until The End Without Any Hesitation?

The third question tested whether the children could remember English words that appeared in the prototype of the children's digital book after one-use. Although the purpose of this design was not only to let children remember English knowledge but also to provide children with a relaxed linguistic environment, it was still important to learn something during this process. Five children learned five or six words in a single-use from the users' feedback, two could learn three or four words, and even one could remember more than seven words. That was a great achievement for the children.

The remaining questions in this questionnaire asked participants to evaluate the design of characters, instructional animation, and interactive functions, respectively. All of these questions were on a scale of 1-5. Most of the participants

How Many English Words Do You Remember After Playing?			
LESS THAN 3	3 TO 4	5 To 6	MORE THAN 7
0	2	5	1

Table 5.3 Were You Able To Play It Until The End Without Any Hesitation?

rated all three questions highly on a scale of four to five. For the question about the design of characters, four respondents said they very like the characters of animals, and three respondents gave the answer on a scale of 4, saying that they like the characters. However, one respondent gave a moderate rating for this question. For the question about the animations, three respondents answered on a scale of 5, and four respondents answered on a scale of 4, which meant they liked the instructional animation design very much. For the question about the interactive functions, four respondents answered on a scale of 5, and three respondents answered on a scale of 4. However, one respondent still gave a moderate rating for the question of the interactive features. Therefore, the designer would keep putting effort into designing characters and interactive functions.

How Do You Like The Characters?				
SCALE 1	SCALE 2	SCALE 3	SCALE 4	SCALE 5
0	0	1	3	4

Table 5.4 How Do You Like The Characters?

How Do You Like The Animation?				
SCALE 1	SCALE 2	SCALE 3	SCALE 4	SCALE 5
0	0	0	5	3

Table 5.5 How Do You Like The Animation?

Finally, the questionnaire also asked participants for their suggestions for designing this children's digital book. One oft-repeated suggestion was to add more interactive features to the digital book. The participants not only wanted to learn English through animation and sound, but they also wanted the digital book to improve play-ability by increasing interaction between different users. If a children's digital book allows multiple players to use and interact online at the same

How Do You Like The Interaction Features?				
SCALE 1	SCALE 2	SCALE 3	SCALE 4	SCALE 5
0	0	1	3	4

Table 5.6 How Do You Like The Interaction Features?

time, it will be more game-like. How to combine a children's digital book with games to make the learning process more pleasant and subtle will be the content that designers will continue to study.

Notes

- 1 Please refer to Appendix for the full survey.

Chapter 6

Conclusion

6.1. Findings and Evaluation

As mentioned repeatedly in this paper, the purpose of this research is to create a listening and speaking centered linguistic environment for children. This linguistic environment is an informal linguistic environment, just like children listen to their parents speaking at home every day. This informal linguistic environment intends to help children be exposed to a language and "intake" the language. In this research, the second language refers to English. Three research questions were raised in the introduction chapter. After two prototype designs and two user tests, some relevant conclusions can be discovered.

First Question

The first research question is: Can this children's digital book create an informal language for children?

In this research, the children's digital book is designed for non-native English speaking families. Because the parents in these families do not speak English or do not usually speak English at home, it becomes necessary to create an informal English linguistic environment for children through children's digital books. Because this digital book is aimed at preschoolers, ages 3 to 6, the contents do not require them to memorize, read, or even recognize words. All children need to do is listen to the book's sound and read the images and animations of the book.

Based on observations and participants' feedback, the children were not asked to memorize anything while using the children's digital book intentionally. Nor is there anything in the book that requires children to spell. Children used this digital book mainly by watching videos and listening to sounds. The good news

is that the children still retained some of the vocabularies they need to learn after using the digital book. Therefore, a linguistic environment based on listening can be created with the help of the children's digital book.

Second Question

The second research question is: Can children grasp what they are expected to learn?

About this question, the parents' responses in the questionnaire were very intuitive. Of the eight children in total, five could remember five or six words they needed to learn, and one child could remember more than seven. It is a positive result for a preschooler to learn so many words when using the children's digital book only once, and not having reviewed it intentionally.

Third Question

The third research question is: Did children and their parents get motivated when using this children's digital book?

Since motivation is a very subjective concept, a more comprehensive approach to testing is needed. Of course, in both user tests, there were several questions about the user experience. The advantage of this children's digital book is that participants responded positively to these user experience questions. Feedback from participants meant that well-designed characters, book content, and exciting animations all helped to increase children's interest and motivation in learning. Besides, because the book is designed to allow children to take it outside, taking it on trips to the zoo also helps increase children's motivation to learn.

In conclusion, this children's digital book could help children and parents in non-native English speaking families to build an informal linguistic environment to help children start learning English since the preschool stage. If the parents could accompany their children to learn English, listening, and speaking out together with their children, they could help the children build the linguistic environment and enjoy the learning process. If parents would like to bring this children's digital book with them while a trip outside, it could make the trip more meaningful, if this children's digital book is used repeatedly, children will be exposed to English a

lot during the review process. They will hopefully learn more English knowledge.

6.2. Limitations and Future Work

6.2.1 Limitations

During the study, some limitations gradually came to light. These limitations, more or less, influenced the results of the study. Therefore, some measures are going to be taken to avoid these problems in future work.

One first limitation is that while children using the digital book with their parents, not all parents spoke out the words with their children. Therefore, whether the linguistic environment based on speaking could be created through the digital book mainly depends on whether parents are willing to speak it out with their children in the process of using it. If, when using this book, parents are willing to listen and speak with their children actively and even accompany their children to study together, a better result could be archived.

The second limitation is that the research did not examine the effects of reuse. According to the literature review and the fieldwork, children need many repetitions to strengthen their memory during learning. So if one child reuses this children's digital book many times, he should be expected to acquire more words.

The last limitation of this research is that visually observing parents and children can better understand their reactions and emotions when using the digital book. In this user test, however, only one parent recorded the learning process. In this process, it could be found that parents and children enjoyed this process, and the parent-child relationship was excellent in this learning process.

6.2.2 Future Work

To better evaluate the effect of this children's digital book on creating a linguistic environment in use, the following improvements will be implemented in future work.

One improvement is to launch more observations of children's reactions and emotions when using the digital book. In this research, children and parents were invited to fill in the survey after use. The self-described feelings of users,

when filling in the survey, might be deviated from the observation of bystanders. Therefore, objective observations will be added in future work to better judge children and parents' feedback in use. Simultaneously, feedback from parents and children will be counted separately, as parents and children may have different feelings about the same product. It will help determine whether the digital book meets the expectations of both children and parents.

The other improvement is to test the learning effect after repeated use. As has been mentioned many times before, repetition in language learning is essential for language acquisition. Therefore, it is not enough to test the number of words that can be remembered after a single-use. The digital book's educational effect would be better demonstrated by testing the learning effect after repeated use. In future work, the children will be divided into groups, where the effects of three repetitions and five repetitions will be tested. The single-use-only group will be added as a control group to observe and investigate the results of the use.

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Appendices

A. Interview with English Teachers in Fieldwork

- Q: When teaching children new knowledge, such as vocabulary and sentences, how many times do you need to repeat?

A: At least twice. Actually, for each lesson, we will repeat everything the children have learned before. Because if children do not review themselves at home, they can easily forget what they have learned previously. Therefore, in the classroom, every knowledge point will be repeated four or five times in the following courses.

- Q: Since your students are children aged 3-6, do you leave homework for them? If you do, what kind of homework do you give to children?

A: Yes, I will leave some simple homework for the children. I will not ask the children to remember those knowledge points deliberately. I only ask them to do more listening at home. I think regular listening can help children become more familiar with the language (English).

- Q: From what age do you think children can start to spell and do memories of words?

A: I don't think children need to learn words spelling or do memories from an early age. Children can start to learn spelling and memories from the beginning of formal academic education. But for my students now, they can remember the pronunciation of English.

- Q: Do you mean that your students (aged from 3 to 6) do not need to remember the spelling of words, but then need to remember the pronunciation?

A: Correct. Students can remember pronunciation by listening and speaking out; that's why we repeat it over and over in class. But they do not need to carry out memory training deliberately.

- Q: What kind of textbooks or additional support materials will you suggest?
A: Our teaching materials can be described in three words – "sound, shape, and meaning". Children learn the sounds and shapes of English words to help with remembering the meanings.
- Q: Is it possible for your students (children aged 3-6) to be taught entirely in English in class? Can the children understand all the instructions in the classroom?
A: The class can be given by English most of the time in class. Because what we teach our children is elementary, simple words and sentences, they can only understand English with appropriate body language and examples. Only part of the content that needs to be clearly defined needs to be explained in the mother tongue.
- Q: Kindergarten children tend to feel nervous and anxious when they leave their parents, and they are reluctant to leave their parents. Do you agree to have parents accompanied in the classroom?
A: I can't entirely agree. Children tend to rely on their parents when accompanied, which also affects their learning efficiency. But we prefer to leave children to learn on their own. However, we will tell parents what we have learned in class so that children can review after class under their parents' guidance.

B. Questions for Parents in Fieldwork

- Q: Your child is still a preschooler. Why do you let your child study English at this age?
A: I think bilingualism is a big trend for kids today. I'm not very good at English myself. I think that was because I started learning English too late. I think it would be easier to learn a second language as early as possible.
- Q: Do you have any expectations for your child when learning English? Like passing a test?
A: My child is still in kindergarten, so I don't have much to ask of him. The

point of taking English classes is to expose him to a foreign language at an early age. But I think it will be very important to pass the English exam in the future, but that will come later.

- Q: Do you think there are any difficulties in children's English learning?
A: Yes. As a parent, I would love to help my children with their English, but we don't speak English at home. I don't think I can create a linguistic environment for my children. My children do not often hear English at home, so it is difficult for them to get used to it. And I don't want to give them listening training deliberately, I don't want to provide them with extra pressure.

C. Questions for Educational Institution Manager in Fieldwork

- Q: As a manager of an educational institution, what do you think are the difficulties in English education for children?
A: In my opinion, the main difficulties can be described from two aspects: one is the difficulty in finding teachers, and the other is the difficulty in finding teaching materials. As the number of students learning English increases, especially the number of preschoolers, we need more excellent teachers. However, many teachers with a professional background in early childhood education do not have sufficient English strength. And many English teachers are not suitable for teaching children, so we need specialized training for them. On the other hand, we lack new and exciting textbooks. The advantage of the current books we use is systematic and comprehensive in content. But preschoolers need something more engaging and accessible.

D. Survey of Prototype 1

Survey of Prototype 1

E. Survey of Prototype 2

Survey of Prototype 2