

INTERNATIONAL JOURNAL
ON INFORMATICS VISUALIZATIONjournal homepage : www.joiv.org/index.php/joivTeachers' Acceptance and Readiness to Use Augmented Reality Book
to Teach English Vocabulary in KindergartensElise Muryanti ^a, Rismareni Pransiska ^a, Novrianti ^b, Yasifa Arkanasya Ummayah ^a,
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Abstract—English is currently introduced in several Kindergartens in West Sumatra, Indonesia. The focus of introducing English in Kindergartens is introducing simple instruction and vocabulary. The literature review and initial observations show that teaching materials and learning resources to introduce English are still limited. This study aims to explore kindergarten teachers' perspectives on storytelling and using Augmented reality books. This research used a mixing method. The participants in this subject were 57 Kindergarten teachers in West Sumatra, Indonesia. The data of this research was collected through questionnaires and interviews. First, the questionnaire was distributed to explore teachers' acceptance and readiness to use augmented reality storybooks in teaching English vocabulary in a classroom. To validate the data from the questionnaire and interview, they were triangulated. The result shows that most teachers do not have a background in English qualification. They believe that AR can be useful in teaching English vocabulary. Regarding readiness to implement the AR book, the teacher feels optimistic about using the AR stories in the classroom. The teachers believe that AR can motivate children to learn. The respondent teachers accept AR and believe that AR books can benefit children in learning English vocabulary. The ease of using AR and the benefits of AR for teaching vocabulary encourage teachers' readiness to utilize AR storybooks for teaching English vocabulary to Kindergartners. Based on the result of this research, the AR storybook is designed to teach English to Children in Indonesia Kindergarten.

Keywords—Augmented reality; story book; teachers' acceptance and readiness.

Manuscript received 7 Aug. 2023; revised 20 Sep. 2023; accepted 4 Oct. 2023. Date of publication 31 Dec. 2023.
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I. INTRODUCTION

English is a lingua franca used as a medium of international relations from the past until the globalization decade. English is crucial for sharing knowledge and information worldwide. Due to the need for English as an international language, support to initially introduce English in Kindergarten [1]–[3]. The focus of teaching English in Indonesian kindergarten introduces English vocabulary as essential recognition [4].

However, the literature indicates several problems in teaching English in kindergartens, such as learning resources and teachers' professionalism. Teachers in Indonesia's kindergartens need an English background [5], [6]. Nunan stated that Asian countries lack trained English teachers [7]. This can affect a child's learning achievement. In addition, the availability of teaching materials still needs to be

improved. Unvaried teaching and learning materials cause children to quickly get bored [8]. The abovementioned problems can be an obstacle to teaching English to children in Indonesian Kindergartens.

The development of technology encourages the presence of augmented reality media for educational practice. Augmented reality is a three-dimensional video presenting a virtual reality picture [9]. Augmented reality is a book with learning videos that can motivate students by providing impressions with pictures, attractive images, and live sound [10]. AR represents a story by using three dimensions, which show virtual and reality. Using augmented reality superimposes digital data on real-world objects or locations; through this, it can improve the users' experience, and AR also reflects the virtual to real life [11].

Augmented reality as a multimedia technology assists young learners in learning and recognizing knowledge and objects around the environment. AR contains visualization

media, which can make children interested in learning [12]. Augmented reality (AR) storybooks facilitate users' interaction between the virtual world and the real world [13], [14]. AR presents virtual objects to the actual situation [15]. AR technology projects the real world and reverses the virtual objects, text, data, and sound that the user sees from a computer, tablet, iPad, or smartphone. Augmented reality is the latest technology used in learning that can motivate students by providing impressions with pictures, attractive images, and live sound [10].

AR book represents the story by using three dimensions, which show virtual and reality. Teachers are undoubtedly motivated to approach their responsibilities with a better sense of purpose and, more crucially, a sense of play and the use of computer-aided technology in the classroom, which will, without a doubt, make studying enjoyable for pupils [16]. AR books are useful for teachers to teach in the classroom [17]. Augmented reality Storybook has been developed to integrate books with digital technology.

AR can be designed for teaching children a foreign language. Their research found that AR media can be used to teach English to children [18] [19] [20]. AR media is an authentic medium, and it provides direct experiences for students in learning [21]. AR as a teaching tool can improve children's communication in English [22]. In addition, Children can learn vocabulary through AR books and listen to the use of vocabulary in the real context by watching and listening to online videos. AR technology combines printed material and video, which can be scanned through a barcode. Children learning using AR have high interest and motivation, so learning is more fun [23]. Children learn English vocabulary, see written words and real objects, and how to pronounce the words using AR books [23]. The teacher's limitations in introducing objects and vocabulary can be solved by using an AR storybook.

Several seminal studies have examined using augmented reality (AR) in learning. AR technology can motivate children to learn [10]. Children learning have high interest and motivation by using AR, making learning more fun [23], [24]. Moreover, AR media can be used to introduce English vocabulary [23], [18]. Chan used flashcards with AR in the experimental class and found no significant difference between using augmented reality media and flash card media. Children's motivation and interest in learning English increased using this AR media. AR media could be utilized to introduce English vocabulary so children could see written words and real objects as well as how to pronounce them using a tablet or smartphone [23]. The teacher's limitations in introducing objects and saying words with the correct pronunciation could be solved by using teaching materials from AR storybooks.

AR storybook has pedagogic benefits for students to learn English. AR as a teaching tool helps to improve children's communication and reduce the cognitive consignment inherent in learning English[22]. Language learners are encouraged to use vocabulary and simple English expressions when they learn English through AR storybooks. AR books contain images, colorful pictures, and videos that can make learning easier and more joyful. Children find learning is not dull by adopting AR.

AR helps children understand abstract concepts, gives learning experiences, and encourages students to participate in the learning process [25]. Children are unique; they understand concrete objects and need stimulation and assistance to understand abstract objects. AR books can help their mind to know the abstract object. Through this, I can learn new vocabulary, which can be seen and heard in the video. Children can understand the vocabulary through the objects shown in the video.

Before designing the AR Media, the study of the technology acceptance model is crucial in designing technological applications for education. Define the technology acceptance model as the ease of use and the usefulness of technological devices that can influence human behavior regarding social influence and cognitive process [26]. Research on teachers' acceptance of the use of technology is crucial to identify their behavior and readiness for technology usage in the classroom. Researchers in this study have investigated the teachers' acceptance and readiness to use an Augmented reality storybook. To study teachers' acceptance and readiness is essential to explore the teachers' beliefs toward the usefulness and ease of use of the media. The usefulness and ease of technology encourage the researchers to design an AR Storybook. Users' acceptance model refers to what they perceive about technology usage [27]. Identifying teachers' acceptance model relates to the psychological factor of perception toward the usefulness and ease of technology.

Several researchers have researched TAM [28], [29]. The teacher Acceptance Model will be identified by looking at the usefulness of technology and the ease of use of technology [29]. Teo studied the teachers' acceptance through survey questions and shared the questionnaire with one hundred fifty-seven participants [29]. The research reveals that attitudes toward ICT contribute to the intention to apply technology.

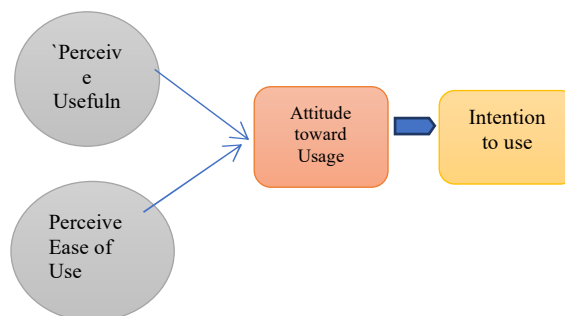


Fig. 1 Technology acceptance model of Davis et al [27]

A survey of 181 Malaysian English language teachers in Klang Valley, Malaysia, it was found that Malaysian English teachers possess quite a high level of acceptance of using Augmented Reality in the teaching of English reading, with 60.8 % (n = 110), and have a high level of readiness in using Augmented Reality in the teaching of English reading at 63.0% (n = 114). The researchers also found a significant correlation between the level of acceptance and behavioral intention ($r = .935^{**}$, $p = .00$, $p < .05$) between teachers' acceptance of their intention to use Augmented Reality in teaching English reading at a .05 level of significance [30]. However, the research on preschool teachers' acceptance and

readiness to use AR storybooks still needs to be completed. The teachers' acceptance and readiness to use AR books to teach English to kindergartners is a gap investigated in this research.

This study aims to explore kindergarten teachers' readiness and acceptance of using AR storybooks to teach English vocabulary to kindergartners. AR storybook will be designed to introduce English vocabulary to children in kindergarten. Before designing AR Kindergarten teachers' perspectives, acceptance and readiness of the AR book will be investigated. The result is crucial in designing an AR book, and it will assist teachers in the implementation of AR stories in teaching English vocabulary to kindergartners in Padang City, West Sumatra, Indonesia. The research questions of this research can be as follows:

- To What extent do kindergarten teachers in Padang West Sumatra accept the Augmented reality in teaching English to children?
- What is the teachers' readiness to teach English in Kindergarten?

II. MATERIALS AND METHOD

This research is a descriptive study to find the correlation between teachers' acceptance and readiness to apply AR storybooks in teaching English to children in kindergarten. This research used a mixing method. The subject of this research is 57 kindergarten teachers in West Sumatra. The purposive sampling technique was employed in this study. The data were collected through questionnaires and interviews. The questionnaire was designed to identify teachers' acceptance of using AR books and their readiness to apply AR books in teaching and learning English in Kindergartens. The questionnaire contains information that is classified into personality and experience, knowledge about AR and acceptance, and readiness to use AR in teaching English vocabulary. The questionnaire was measured with 5 points Likert scale. This questionnaire was adopted from seminal research, which is closely related. For teachers' acceptance of the Technological usage was adopted [29], [30]. The adopted Theo model explored the teachers' acceptance of the AR storybook, the benefits of teaching vocabulary to children, and the ease of implementation.

Then, kindergarten teachers were also interviewed about their acceptance and readiness to teach English to kindergartners by using AR books. Before the interview began, teachers first introduced the media, and afterward, they learned about the concept of AR books. Then, the teachers were interviewed to find their acceptance and readiness to teach English to children through AR books. The interview was then transcribed and analyzed to identify

teachers' acceptance and readiness to teach English and Use AR storybooks in the classroom.

This research was conducted Ethically. Before conducting the research, the researcher proposed a research permit to the Indonesia Ministry of Education of Padang Municipality and the kindergarten boards. Teachers who participated in this research were informed before participating and participated voluntarily. The questionnaire was distributed to the respondents. Moreover, the research participants were interviewed with open-ended questions. Ten percent of representatives were selected from the total teachers.

Then, the data were analyzed using SPSS to find the mean, standard deviation, and percentage. The correlation analysis was calculated to identify whether teachers' acceptance closely correlates with readiness to teach children English vocabulary using Augmented reality books. For correlation analysis, inferential analysis was used using the Pearson Product Moment formula. Then, the interview data were analyzed, described, and categorized based on the acceptance and teachers' readiness. Both data were analyzed to find out the extent of teachers' acceptance and readiness.

III. RESULT AND DISCUSSION

A. Results

There are three classifications of the data gathered for the research: personality or learning experience, knowledge and acceptance, and readiness to implement AR for kindergarten children in the classroom. The research framework about teachers' acceptance and readiness can be illustrated in the following figure:

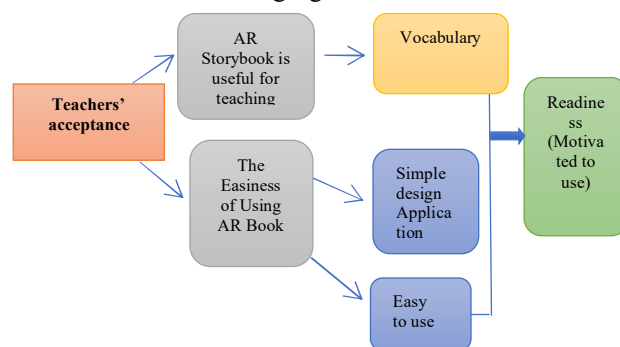


Fig. 2 Research Framework

This research describes the acceptance of kindergarten teachers in using AR books as media for teaching English to kindergarten students and the readiness of the teachers to use this media in the teaching and learning process based on indicators in construct variables. The following table describes the descriptive data of kindergarten, teachers' acceptance, and readiness to teach English vocabulary.

TABLE I
DESCRIPTIVE STATISTICS

Indicator	Mean	SD	(1)	(2)	(3)	(4)	(5)
Personality or learning experience	3.22	0.45					
Experience teaching English in kindergarten	3.30	1.093	11.1%	5.6%	35.2%	38.9%	9.3%
Love teaching English to Kindergarten children	3.94	1.250	9.3%	3.7%	13.0%	31.5%	42.6%

Indicator	Mean	SD	(1)	(2)	(3)	(4)	(5)
Teaching English related to learning themes in kindergarten	3.54	1.239	11.1%	3.7%	31.5%	27.8%	25.9%
Using Story Books in Teaching	2.91	1.186	16.7%	16.7%	33.3%	25.9%	7.4%
Using animated stories in teaching, which can be accessed using a smartphone or cellphone	2.87	1.304	22.2%	13.0%	31.5%	22.2%	11.1%
Introduce English by playing English stories on the laptop.	2.80	1.309	22.2%	18.5%	27.8%	20.4%	11.1%
Knowledge and Accepted of Augmented Reality Books	3.87	0.16					
Know Augmented reality (AR) books/stories (story books equipped with video stories that can be accessed by scanning a barcode)	3.67	0.952	3.7%	3.7%	33.3%	40.7%	18.5%
AR can be used to introduce English vocabulary	3.89	0.945	5.6%	0%	16.7%	55.6%	22.2%
AR facilitate children to see the real object of the vocabulary	3.89	0.883	3.7%	0%	22.2%	51.9%	22.2%
AR is interesting and motivated	3.80	1.035	7.4%	0%	20.4%	50.0%	22.2%
Using AR book can ease teaching, learning activity	4.13	0.646	1.9%	0%	3.7%	72.2%	22.2%
Readiness	4.23	0.05					
Teachers are ready to use AR in the classroom, if it is available	4.20	0.655	1.9%	0%	1.9%	68.5%	27.8%
AR book suit with children need to learn object	4.20	0.655	1.9%	0%	1.9%	68.5%	27.8%
AR book application is easy, it is easier to be utilized	4.30	0.717	1.9%	0%	3.7%	55.6%	28.9%

This research involved three constructions: personality or learning experience, knowledge and acceptance of augmented reality books, and readiness. Based on responses toward the Personality or Learning experience, the result shows that, on average, teachers rarely teach English to kids (M 3.22, SD= 0.45). This data indicates that the teaching experience of the teachers still needs to be enriched. The other data show that some teachers have already introduced English to students through various media, which commonly used is storybook (M= 2.91, SD= 1.186) while through smartphones (M=2.87, SD= 1.304) and through laptop (M=2.80, SD= 1.3099)

Furthermore, the storybook used in teaching is the Augmented Reality Book. The Knowledge and Acceptance of Augmented Reality: On average (M= 3.67, SD= 0.952) teachers know how to use this book (showing video by scanning the barcode). Based on Table 1, the use of an AR

book is relevant in assisting students in comprehending English vocabulary (55.6%) because this book shows the nouns introduced to students directly and followed by how to pronounce the nouns. This book is commonly used to improve the students' motivation and interest (50%) to learn English. Therefore, it can be concluded that, on average, teachers already know and are able to use AR books to help children understand English (M= 3.82, SD= 0.16).

In addition, the data indicate that most teachers are ready to teach English to children by using AR books ((M=4.23, SD= 0.05). The readiness can be identified through the teachers' willingness to use AR book as teaching media (M= 4.20, SD= 0.655). The teachers also agree that this book is easy to use (M=4.30, SD=0.717) in introducing things or objects to children because children need to learn things in English through objects (M=4.20, SD=0.655).

TABLE II
ROTATED COMPONENT MATRIX AND CRONBACH'S ALPHA: TEACHERS' READINESS IN TEACHING ENGLISH IN KINDERGARTEN: THE VALIDITY

Constructs	Indicator	α	Factor		
			1	2	3
Personality or learning experience	*Experience teaching English in kindergarten.	0.913	0.791	0.323	0.121
	*Love teaching English to Kindergarten children.		0.757	0.413	0.133
	*Teaching English related to learning themes in kindergarten.		0.810	0.408	0.074
	*Using story books in Teaching		0.795	0.089	0.385
	* Using animated stories in teaching, which can be accessed using a smartphone or cellphone		0.730	-0.012	0.468
	*Introduce English by playing English stories on the laptop.		0.734	-0.118	0.433

Knowledge and Accepted of Augmented Reality Books	*Knowledge of Augmented reality (AR) book/ stories (stor	0.891	0.234	0.192	0.795
	books equipped with video stories that can be accessed by scanning a barcode)				
	*AR can be used to introduce English vocabulary		0.262	0.348	0.785
	* AR facilitate children to see the real object of the vocabulary		0.210	0.457	0.712
Readiness	* AR is interesting and motivated		0.421	0.363	0.657
	* Using AR book can ease teaching, learning activity		0.175	0.747	0.367
	*Teachers are ready to use AR in the classroom	0.947	0.165	0.903	0.191
	* AR book suit with children need to learn object		0.096	0.892	0.295
	*AR book application is easy; it is easier to be utilized		0.233	0.870	0.151

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

There were 14 indicators used in constructing this research. The indicators were presented on 5 points Likert scale with a very high reliability. To test the validity of these indicators, researchers used factor analysis. The result is shown in Table 2, where three new factors were created. There were four indicators for Personality or Learning experience in factor 1. All indicators for readiness are placed in factor 2, while factor 3 provides 2 indicators of knowledge and acceptance of Augmented Reality books.

The factor analysis shows a new latent construct, which is almost the same as the original construct. Only five constructs are not part of the new constructs, and there is no place changing on the indicators in other indicators. For the consistency internal test, the result shows a high reliability score. Therefore, it can be concluded that the original construct is not so different from the new construct. However, if further tests are needed, new constructs are suggested for comparison.

TABLE III
CONSTRUCT PEARSON CORRELATION

	1	2	3
1. Personality or Learning Experience	1		
2. Knowledge and Accepted of Augmented Reality Books	0.654**	1	
3. Readiness	0.439**	0.644**	1

Correlation is significant at the 0.01 level (2-tailed). **

Based on data in Table 3, the three constructs have a strong positive correlation, one and another ($p < 0.01$). Personality or Learning Experience and Knowledge and Accepted of Augmented Reality Books have correlation scores bigger than other correlations ($r = 0.654$, $p < 0.01$). This data indicates that teachers with knowledge and understanding of AR books already have better experience in teaching English. Knowledge and acceptance of Augmented Reality Books and Readiness also correlate strongly ($r = 0.644$, $p < 0.01$). This means that knowledge about AR books can increase the readiness of teachers to teach English. Personality or Learning Experience and Readiness have the lowest scores among the other three constructs ($r = 0.439$, $p < 0.01$). However, the score is in the middle correlation, which means the data indicate the teaching experience may increase the teachers' readiness for teaching.

Since the three constructs have a strong correlation, the constructs are suitable to figure out the acceptance of teachers in using AR books as media for introducing English to kindergarten students and the teachers' readiness to use

the media in their teaching and learning process. The descriptive analysis shows that most teachers are ready to use this medium. The teachers think that AR books are easy to use and suit the needs of the children in learning English. That is why the new constructs in factor 2 indicate all readiness indicators. It can be concluded that using AR books may ease the teacher's reach for learning purposes and also increase the teachers' readiness to teach English to kindergarten students.

The statistical data and interviews indicate that some of the teachers already understand how to use AR books and how to access the video by scanning the barcode. This book introduces things accompanied by words and how to pronounce them in English, which can help children recognize and memorize the words. Teachers explain that the AR book is interesting. It can motivate children to learn English. However, teachers rarely introduce English to children using smartphones and laptops to teach and learn English vocabulary. However, they are willing to adopt AR books to teach English to children.

B. Discussion.

Teaching English in Kindergarten aims to introduce simple English vocabulary to children. Children listen to the story through the teachers' stories and videos. As AR explained, abstract objects help children understand abstract concepts, give a learning experience, and encourage students to be active in the learning process [25]. Children learn the object through the animation in the book and the video. The colorful animation in the video and the simple text describes the object taught by teachers.

Kindergarten teachers in West Sumatra believe that AR books can be used to introduce English vocabulary to children. The research found that AR stories can develop learners' English vocabularies [20]. Through AR, children can learn vocabulary; they can learn the object, and this benefits children and assists them in memorizing vocabulary.

Playing and listening to AR Story improves children's communication and reduces the cognitive consignment inherent in learning English [22]. Kindergarten teachers believe that AR books can benefit children in learning English. AR benefits to motivate children to learn English. The respondent teachers (67.9 percent) believe that AR books can motivate children to learn English. The research shows that AR technology can motivate children to learn [10]. Children learning using AR have high interest and motivation, so learning is more fun [23], [24]. The data from the questionnaire indicated that teachers believe that AR stories can motivate children to learn English. AR

storybooks can support children in learning English in Kindergarten, and children will find learning more enjoyable. Furthermore, the respondent teachers believe that children learning through AR storybooks will benefit and enhance children's vocabulary mastery.

IV. CONCLUSIONS

Based on the previous result and discussion, the constructs used in this research can describe teachers' acceptance of AR books and their readiness to use this book as a medium of introducing English to children. New factors created from the factor analysis are similar to the original construct. It can be used as a comparison for further research of both factors. The constructs have a positive correlation, and the correlation score is high, which indicates that the three factors have a strong correlation in increasing the acceptance and readiness of teachers to use AR books in teaching English. AR storybook is accepted as an English learning resource. The teachers responded that they have experience teaching children English vocabulary, although some teach three or four times a semester. Several kindergarten teachers need to have English qualifications, and they teach English in kindergartens in bilingual, Indonesian, and English. The respondents believe that AR is beneficial for children to learn English vocabulary. Children can play, read, and listen to stories through videos in AR books. Teachers believe that AR is motivating and interesting for children. The simple design and easy-to-use AR motivate teachers' belief and readiness to adopt AR in teaching and learning English in the classroom.

The research participants indicate that they accept and are ready to utilize the Augmented Reality Storybook to teach children English. The book's usefulness and ease of use in the classroom motivate kindergarten teachers to implement this book in the classroom. As proposed, the TAM of teachers' acceptance is identified through the usefulness and ease of use of the technology to adopt [29]. The research data indicates that teachers are ready to use AR books. Teachers in the interview support their choice in the questionnaire, and they believe that AR can be implemented to teach English vocabulary in kindergarten. Since the application is easy and accessible, teachers can use this book in the classroom. The teachers agree that using AR in the classroom belief that it is beneficial and accessible, and the mode of application is simple as the teachers access the video by scanning the barcode, which is inserted in the book.

Based on the teacher's acceptance and readiness to use AR, then the AR book can be implemented to support teaching English vocabulary in kindergarten. This research will be the consideration for designing an AR storybook. However, immersing the book in learning requires trained teachers and digital devices such as smartphones, notebooks, iPads, or tablets.

ACKNOWLEDGMENT

We thank the Research and Community Service Institute of Universitas Negeri Padang for supporting the research fund and permitting the conduct of this research—special thanks to kindergarten teachers and principals in West Sumatra for your collaboration and time.

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