



## USING AUGMENTED REALITY FLASHCARDS TO IMPROVE ENGLISH VOCABULARY MASTERY FOR CHILDREN AGED 4-5 YEARS

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**Abstract:** *English vocabulary mastery is essential in early childhood English learning in the Industrial Revolution 4.0 era. The use of digital learning media, such as augmented reality flashcards, is also needed to teach English vocabulary to young children who are now accustomed to digital technology. This study aimed to improve the mastery of English vocabulary in children aged 4-5 years by using augmented reality flashcards. This research was conducted in August–September 2022. This research is classroom-action research using Kurt Lewin’s model, which consists of 3 cycles. Each cycle consists of planning, acting, observing, and reflecting. Data collection techniques use observation and documentation. Data analysis uses the Miles and Huberman model for qualitative data and simple statistics (percentages) for quantitative data. The subjects of this research are all children aged 4-5 years at Marsudisiwi Kindergarten, Laweyan Surakarta, totalling 20 children. The results show an increase in children’s English vocabulary mastery from cycle one of 35%, which increased to 85% at the end of cycle 3 for the very well-developed category. The increase was also seen in the number of words the children learned, the correct pronunciation of the given language, and the ability to distinguish the meaning of one word from another.*

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**Keywords:** *English Vocabulary, Augmented Reality Flashcards, 4–5-Year-Old Children*

## A. Introduction

English plays a significant role in the Industrial Revolution 4.0 era. According to Sophya (2014), English has become an international language used in almost all areas of global life as a communication channel. This language has also become a world language to connect and transfer knowledge worldwide. This language is used in all aspects of people's lives, including education. As a result, English is one of the courses offered in schools and universities globally, and in some countries, learning English is considered a foreign or second language. This language is now the most widely taught foreign language in over 100 countries worldwide. This also happens in Indonesia, where English is a foreign language. With this status, it becomes the language that children are most likely to be taught at school (Crystal, 2003).

Four skills must be mastered when a person learns a new language (foreign or second language), namely listening, reading, speaking, and writing skills. However, to master these four language skills, vocabulary must be the fundamental skill for a person to learn a language. It is a significant component in supporting these skills because it can make spoken and written communication easy (Setyoningsih, 2016). English learners in foreign language contexts should be good at the four skills and vocabulary (Amal Shehadeh AlNatour & Dima Hijazi, 2018). It is concluded that foreign or second language learners should be good at vocabulary mastery to support the four English skills.

Vocabulary mastery is essential for second and foreign language learners because a lack of vocabulary in a second or foreign language causes unsuccessful communication. It is because they do not know any English vocabulary well and prefer to communicate in their native language, which they learned as children and use daily (Hudaya & Sadikin, 2019). It is also caused by the fact that vocabulary is one of three language elements that have an essential role in mastering four language skills. Others are pronunciation and grammar (Susanto et al., 2020). Mastery of vocabulary is also a linguistic element that supports English learning, such as pronunciation, spelling, grammar, phonology, morphology, syntax, and discourse.

Similarly, it happens in early childhood when they have to learn a second or foreign language. They must be concerned about some English elements, such as vocabulary, pronunciation, spelling, and structure (Linse in Bakhsh, 2016). To master English skills well, children must know more about English vocabulary. Based on these opinions, vocabulary is essential for children to learn and master a foreign or second language.

The term “vocabulary” is defined as a list of words and their meanings (Linse in Bakhsh, 2016). It can also be interpreted as a collection of words that someone understands. (Sudrajat & Herlina, 2015). It means that if children understand a lot of vocabulary (words and their meanings), it can support their language skills (listening, reading, speaking, and writing). With a strong foundation for vocabulary, understanding and appropriate language use will be obtained.

Regarding the importance of mastering vocabulary, with mastery of grammar, there will be more to say, and with vocabulary, one will be able to say everything. Children usually label every object when learning to speak and develop their categorisation skills for the thing (Thornbury in Bakhsh, 2016). Regarding the importance of mastering English vocabulary in early childhood, Hidayati (2017) states that the ability to understand English vocabulary will benefit children when they enter the next educational level. These two opinions further strengthen the notion that English vocabulary for early childhood is an essential skill to become a provision when they enter the elementary school level and have begun to be introduced to reading material or speech.

The initial vocabulary that children know is acquired from adult speech and their environment. Commonly, children want to understand the main vocabulary first, such as nouns, verbs, and adjectives. However, of the three types of words, they will find that nouns are easier to understand than the other two because they are tangible or refer to real objects or artificial forms (Dardjowidjo in Hotimah, 2010). For this reason, it is appropriate if early childhood is introduced and given as much knowledge as possible about nouns according to the daily theme or topic chosen by the

children or teacher from the syllabus, such as the theme of animals, body parts, fruits, clothes, transportation, favourite toys, and so on. Furthermore, someone's language skills can be seen from his vocabulary, which will be used in daily communication. In early childhood, when they have much vocabulary, it will be easier for them when they are invited to communicate with the people around them (Hotimah, 2010).

Early childhood can acquire English, especially English vocabulary, if it is received and processed like a first language. The environment and a suitable stimulus affect the acquisition of children's language. The inspiration that the teacher can use in the class is learning media, such as flashcards, big books, and puzzles. The environment can be set up so they acquire their foreign language using natural means (Stephan., 2006). Early childhood is the most sensitive and critical period of language in someone's life, namely the age of 2–7 years. All aspects of speech must be introduced to children before this sensitive period ends. It is appropriate that English be taught to children as early as possible because they have extraordinary memory skills (Pamungkas, 2021). The sooner children are introduced to English as a foreign language, the more time they must learn it. Children at this age are in an excellent stage of linguistic development and become the basis for further linguistic development. At the same time, learning a foreign language will improve children's memory, thinking, perception, imagination, and so on (Stakanova & Tolstikhina, 2014). Based on this opinion, early childhood is the right time to introduce foreign languages according to their abilities and needs. They can absorb everything from their environment. Likewise, absorbing foreign language vocabulary can be done effectively and optimally at this age.

According to the characteristics of early childhood, they are in the pre-operational stage. In this stage, foreign language learning at school should start as early as possible and be packaged in a suitable form to arouse their interest in learning. One source of children's attention in the class is a picture of learning media. Children enjoy looking at pictures mainly their attractiveness, clarity, and colourfulness (Penny, 1996). Many illustrations, models, and other activities are also

required in early childhood (Khairani, 2016). Besides, they need learning media, such as audio-visual (Fatihaturosyidah & Septiana, 2019). A teacher can use the advancement of digital technology in this digital era to use picture and audio-visual learning media. It also integrates technology and English material into the teaching-learning process in the class.

In addition, one of the language learning approaches that can be used, especially for children, is the scaffolding theory proposed by Bruner. He also mentions several indicators of effective English learning activity using scaffolding, such as: presenting material in exciting ways using appropriate media and learning resources (Fatihaturosyidah & Septiana, 2019). It is concluded that learning media are essential in teaching English to children based on their learning approach and characteristics.

Based on initial observations made by the researchers at Marsudisiwi Kindergarten, Laweyan, Surakarta, in early August 2022 regarding mastery of English vocabulary, there are 20 children aged 4-5 years, of whom three, or 15% of the total, have excellent developmental abilities. At the same time, two children, or 10% of the total number of children, can develop according to expectations. Five children, or 25% of the total, can begin to grow. At the same time, the remaining ten children, or 50% of the total children, can master English vocabulary at an undeveloped level. Based on the initial data, it can be proven that the mastery of English vocabulary for children aged 4-5 years at Marsudisiwi Kindergarten, Laweyan in Surakarta, could have been more optimal. The indicators used in mastering English vocabulary are the ability to pronounce English words correctly, knowing the meaning of each word given, and distinguishing one word from another. Based on the interview with the teacher at this school, the children have practised very minimal English language learning. This is also due to the limited availability of learning media in schools and the fact that the teaching-learning process has yet to take advantage of technological advances. The teacher who teaches English does not have an English educational background and has never attended training or seminars related to teaching English in early childhood. It

makes her feel insecure when teaching English to her children.

Based on these problems, the importance of vocabulary mastery as a critical element in teaching and learning English, children's characteristics, and the learning approach, teachers need to use effective ways and suitable strategies to help students develop their vocabulary knowledge and to improve their language comprehension and production skills (Amal Shehadeh AlNatour & Dima Hijazi, 2018). With rapid technological advancement today, the best way to teach English vocabulary is to use augmented reality flashcards (AR flashcards) as learning media. Implementing this teaching aid can help children learn vocabulary faster than usual (Nurhasan et al., 2019).

Augmented reality (AR) learning media take a unique position in learning. This is related to the existence of AR as a 4D medium that displays objects as real. This media is computerised information or data placed in the world as if they were real objects (Hudaya & Sadikin, 2019). In other words, AR, as a set of technological devices, can give virtual information to physical objects to form a real-life appearance of physical and digital information (Cabero and Barroso, 2016). The other advantage of AR is that the audio produced by the AR object gives attractiveness and explanations about the name and sound of the object itself (Wulandari et al., 2020). It means that children can see the object's shape, listen, and imitate the correct pronunciation of the object's name. Vocabulary learning through AR is one of the innovations in teaching vocabulary. Currently, teachers use AR to combine technology, material, and learning processes so that the students do not feel bored when they learn vocabulary (Da Silva et al., 2019). AR can also help students learn, making the whole teaching and learning process more exciting and fun. This is caused by the fact that the student can use the smartphone to scan the barcode in the AR flashcards, and it gives 4D objects. Besides, students are now familiar with using smartphones in their daily lives. They often have their smartphone to use in the learning process, especially when learning online during the previous pandemic.

The research related to the use of AR that has a positive impact on learning English vocabulary for children is as follows: (Santos et al., 2016) conducted research related to AR as multimedia in teaching children's English vocabulary. The results of his study show that AR can improve memory skills in vocabulary and increase students' attention and satisfaction. The other research was conducted by Angreani and Satrio (2002). They developed flashcards with the help of augmented reality applications using the research and development approach (ADDIE model). The results showed that the augmented reality-based flashcards they set met valid and practical criteria for introducing wetland animals to early childhood. In this study, it was also known that there was an effect of using AR-based flashcards on increasing the achievement of children's development. Thus, from the results of these studies, it is known that AR can provide benefits or positive outcomes in children's English vocabulary learning.

The focus of this research is an effort to increase the mastery of English vocabulary (nouns) for group A (children aged 4-5 years) at Marsudisiwi Kindergarten, Laweyan, Surakarta, by using augmented reality flashcards (AR flashcards). AR flashcards used in this study are Animal 4D augmented reality flashcards issued by [www.octagonedu.com](http://www.octagonedu.com). The theme selection of AR flashcards is adjusted to the theme in the syllabus given by the teacher to the children in the class. The class's teaching-learning process topic was animals when this research was conducted. These flashcards were chosen and used in this study due to the colorful display of the cards, which makes them more attractive for children; the pronunciation of English vocabulary is correct and audible, as well as other additional information. In one set of AR flashcards, there are 28 cards, which consist of 25 animal picture cards, three animal food cards, and one application card for the AR flashcard. These AR flashcards also provide information about where animals live, such as land, water, and air.

The animals in the AR flashcard look alive, especially when they are given food cards. When two cards are paired—an animal picture card, such as a monkey, and a food card, such as a banana card—when the barcodes of the two cards are

scanned together by a smartphone, the monkey will appear to move toward the banana fruit and eat it. At the same time, the pronunciation appeared as the word “monkey” (/mki/) and monkey sounds. Of course, these advantages will make children more interested in learning English by utilising the sophistication of AR flashcard technology.

Another advantage of the AR flashcards issued by [www.octagonedu.com](http://www.octagonedu.com) is that each card is also equipped with information related to the animal category based on the type of food consumed, such as the animal belonging to the herbivore, carnivore or omnivore group. In addition, this card is also equipped with information about the environment in which animals live, namely savanna, forest, livestock, tundra, poles, or oceans. This information also provides children with new knowledge regarding the characteristics of each animal in addition to the prior knowledge related to the English pronunciation of animal names accompanied by the sound or how to move the animal. The following is an example of AR flashcards used in this research.

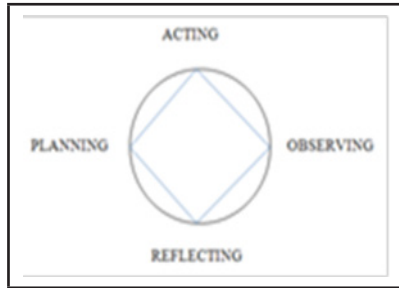


**Figure 1.** *Animal 4D augmented reality flashcards from [www.octagonedu.com](http://www.octagonedu.com)*

## B. Method

This research is classroom action research (CAR) using Kurt Lewin’s model, as shown in the model below. One cycle consists of four stages; planning, acting, observing, and reflecting. The four stages are shown in the image below.





**Figure 2.** Kurt Lewin's classroom action research model

This research took place over three cycles, from August to September 2022. The research was carried out when children could fully participate in the teaching-learning process at school and did not take turns taking place, as was the case during the pandemic period, so that researchers who collaborated with teachers could carry out maximum action. The research activity uses Animal 4D augmented reality flashcard media from [www.octagonedu.com](http://www.octagonedu.com). The problem the researchers want to solve is mastering English vocabulary, especially about animals. Data collection techniques use observation and documentation. The instrument used to collect research data is the observation sheet. The data validity test uses triangulation techniques. The data analysis technique uses simple statistics in the form of the average percentage score (P) with the following formula:  $P = f/n \times 100\%$

Description: P: Percentage Number

f : Number of children who have changed (in the same category)

n: Total number of children

### C. Result and Discussion

This research was carried out in three cycles. Before the research was conducted, the researchers made some preliminary observations regarding the mastery of English vocabulary for children aged 4-5 years at Marsudisiwi Kindergarten. The result showed that the English vocabulary mastery of the children had not been optimal. Children in

the very well-developed category who could pronounce English words correctly knew the meaning of each word given and distinguished between one word. Another was only three children or 15% of the total 20 children. In other words, the ability to master the English vocabulary of 4–5 children at Marsudisiwi Kindergarten is still low. It needs to improve the children’s vocabulary mastery in this research by implementing selected AR flashcards. The results of the initial mastery of English vocabulary for children aged 4–5 years in kindergarten are shown in table 1 below.

**Table 1.** The Results of Pre-Cycle Observations on 4-5-year-old children’s English vocabulary mastery

<b>Table</b>			
<b>No</b>	<b>Number of Children</b>	<b>Percentage</b>	<b>Category</b>
1	3	15	Very-well develop
2	2	10	Develop according to expectation
3	5	25	Begin to develop
4	10	50	Undeveloped
<b>Total</b>	<b>20</b>	<b>100</b>	

Table 1 shows the results of the initial observations as pre-cycle data for this research. From these results, it is necessary to find a solution using learning media like Animal 4D augmented reality flashcards issued by [www.octagonedu.com](http://www.octagonedu.com). For this reason, the researchers collaborated with the class teacher and then began to enter the first cycle of research.

Related to the steps in carrying out classroom action research based on Kurt and Lewin’s model, the first stage was planning everything before the action was carried out in the class. The researchers made lesson plans and observation sheets and prepared AR flashcards. The classroom teacher, guided by the researchers, first installed the Animal 4D augmented reality flashcards

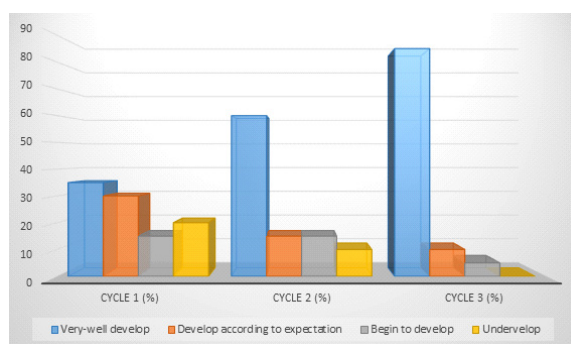
on her smartphone, which were used for teaching an animal to the children. In each stage of the AR flashcard implementation, the researchers collaborated with the classroom teacher, including making lesson plans.

In cycle one, at the action stage, the teacher began to introduce the use of AR flashcards to children. She used eight AR flashcards with the theme of animals living in the forest: elephants, giraffes, monkeys, deer, lions, jaguars, raccoons, and wolves. Likewise, in cycles 2 and 3, the teacher used eight AR flashcards. She also prepared a smartphone as a tool to scan the barcode on the flashcard. When the children were able to operate the AR flashcards, the researchers and the teacher made observations using observation sheets related to the pronunciation of English vocabulary, understanding the meaning of each vocabulary word that the children learned, and the ability to distinguish the meaning of one word from another. And at the end of each cycle, the researchers, together with the teacher, reflected to find out the shortcomings of the actions taken and determined corrective solutions for the following process.

After the application of AR flashcards in each cycle, it is increasingly seen that there is a significant increase in English vocabulary mastery for children aged 4-5 years at Marsudisiwi Kindergarten. The number of children in the very well-developed category has increased from 7 children, or 35% of the 20 children in cycle 1, to 18 children, or 85% of the total number of children in cycle 3. On the other hand, the number of children in the 4th category, which still needs to be developed, has decreased, and finally, in cycle 3, there are no children in that category. This is the expected result of this study: problems related to mastering English vocabulary for children aged 4-5 years at Marsudisiwi Kindergarten can be resolved by implementing AR flashcard learning media. The results of getting English vocabulary using AR flashcards are shown in table 2 and figure 3 below.

**Table 2.** The Results of Observation Cycle 1, Cycle 2, and Cycle 3 regarding Mastery of English Vocabulary for Children aged 4-5 Years

NO	Cycle 1		Cycle 2		Cycle 3		Category
	Num ber of Chil dren	Per cen tage	Num ber of Chil dren	Per cen tage	Num ber of Chil dren	Per cen tage	
1	7	35	12	60	18	85	Very-well develop
2	6	30	3	15	1	10	Develop according to expectation
3	3	15	3	15	1	5	Begin to develop
4	4	20	2	10	0	0	Undeveloped
Total	<b>20</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>20</b>	<b>100</b>	



**Figure 3.** The diagram of Cycle 1, Cycle 2, and Cycle 3 Result

In addition to the quantitative data in the above observations, photos of the AR flashcard implementation activities at Marsudisiwi Kindergarten are shown below. The images represented the children's enthusiasm when

the teacher used the AR flashcard. The children also seemed happy and interested in using AR flashcards. They took turns scanning the AR flashcard's barcode to hear animal names' English pronunciations based on their sounds and movements. In addition, the teacher also involved the children in identifying the category of each animal (carnivore, herbivore, or omnivore) and its habitat. This is undoubtedly additional knowledge about animal characteristics for children. They were easier to know, pronounce, and differentiate between one vocabulary and others. The meanings of vocabularies (words) with images and voices in AR can be expressed more vividly and interestingly. It can help the students memorise the words easily (Tsai, 2020). The same opinion is also conveyed by Chen, Zhou, Wang, and Yu (2017), who have researched to evaluate the effectiveness of integrating AR in vocabulary learning, namely AR media. This medium can increase students' interest and their active participation in vocabulary learning. The other benefit of AR is that it can improve children's motivation to learn English vocabulary (Li et al., 2014). The effectiveness of AR is also mentioned by Takkaç Tulgar et al., 2022. AR can improve learning success, learner motivation, satisfaction, the cognitive aspect of learning, and learner engagement. From those researchers, it can be said that there are many benefits to using AR as a medium for teaching English vocabulary to children.

In addition to the research results above, the children at Marsudisiwi Kindergarten enjoyed learning English vocabulary using AR flashcards. They were not worried, even though they might think learning English is difficult. This is conveyed by Küçük et al. (2014), who state that children learning English, especially vocabulary using AR, will enjoy the learning experience more and have lower anxiety. The following is documentation of children learning English vocabulary using AR flashcards.



**Figure 4.** Children use AR flashcards to learn English vocabulary

Based on the information from the teacher interview, using AR flashcards can help them teach English vocabulary to their students when they have to introduce English animals with their characteristics. It is indeed a solution for the teacher at Marsudisiwi Kindergarten, who is constrained when teaching English to her students. By applying this medium, she feels more confident in teaching English vocabulary, especially animal names, to their students.

This is like the research on AR use in early childhood learning conducted by Umami et al. (2021). Their research uses AR-based flashcard media, a technology that combines virtual objects with the real world by providing an accurate picture of various marine animals. The research results show that AR-based flashcards will make it easier for young children to recognize marine animals. In the conclusion of their research, they also state that flashcard media using augmented reality technology as a learning aid can attract children's interest and focus. This medium can also make it easier for teachers and parents to provide an understanding of marine animals to children (Utami et al., 2021). This is the same as the benefits felt by the teachers at Marsudisiwi Kindergarten, who are helped by using AR flashcards to teach English vocabulary to their students.

#### **D. Conclusion**

Mastery of vocabulary in learning English in early childhood is one of the essential elements in mastering the four English skills (listening, reading, speaking, and writing).

In the industrial revolution 4.0 era, teaching English in early childhood also necessitated the use of advances in digital technology. Using AR flashcards in learning English for children aged 4-5 years at Marsudisiwi Kindergarten can significantly increase the mastery of English vocabulary. It can be seen from the learning outcomes at the end of the study in the number of children who were categorized as having very well-developed abilities. There are 18 children in the “very well-developed” category, and no children were classified as underdeveloped. The advantages of teaching English vocabulary using selected AR flashcards are that the children look enthusiastic, happy, motivated, and have no worries. It can also be seen when children use hardware devices (smartphones) to scan the cards while correctly pronouncing English vocabulary. The ability to know the meaning of each word in a given vocabulary and to distinguish the meaning and pronunciation of one word from another also increases significantly. It is caused by AR flashcards that present 4D images of animal objects that are real: the animal can move, eat, and make a sound. Finally, it can be concluded that the implementation of AR flashcards can provide many benefits for children as well as for teachers.

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