

# The Impact of Augmented Reality in English Learning in Elementary Schools

Rugaiyah<sup>1\*</sup>, Istiqamah Ardila<sup>2</sup>, Unan Yusmaniar Oktawati<sup>3</sup>, Nanda Saputra<sup>4</sup> 

<sup>1</sup> Universitas Islam Riau, Riau, Indonesia

<sup>2</sup> Sekolah Tinggi Agama Islam Rasyidiyah Khalidiyah Amuntai, Amuntai Utara, Indonesia

<sup>3</sup> Universitas Gadjah Mada, Yogyakarta, Indonesia

<sup>4</sup> Sekolah Tinggi Ilmu Tarbiyah Al-Hilal Sigli, Aceh, Indonesia

## ARTICLE INFO

### Article history:

Received July 31, 2023

Accepted December 22, 2023

Available online February 25, 2024

### Kata Kunci:

Augmented Reality, Sekolah Dasar,  
Media Pembelajaran Bahasa  
Inggris

### Keywords:

Augmented Reality, Elementary  
School, English Language Learning  
Media



This is an open access article under the  
CC BY-SA license.

Copyright © 2024 by Author. Published by  
Universitas Pendidikan Ganesha.

## ABSTRAK

Peran bahasa sebagai sarana terpenting untuk komunikasi yang efektif diakui secara universal. Dalam konteks pendidikan, siswa diharapkan mengenali potensi pemerolehan bahasa Inggris dibantu media. Media menjadi alat bantu belajar bahasa Inggris. Fakta, penggunaan media dalam belajar bahasa Inggris minimal. Tujuan untuk mengetahui hasil penerapan augmented reality sebagai media pembelajaran mata pelajaran bahasa Inggris di sekolah dasar. Metode dalam penelitian ini adalah mixed methods yaitu survey, observasi dan dokumentasi. Subjek penelitian ini adalah seorang guru dan siswa sekolah dasar pada mata pelajaran bahasa Inggris. Teknik pengumpulan data, nonverbal berupa gambar, dibantu dengan teknik rekam, dengan metode menyimak. Instrumen pengumpulan data menggunakan angket, dan lembar wawancara. Teknik analisis dengan multimodal dan hasil wawancara dikumpulkan, direduksi dan disimpulkan. Hasil penelitian adalah guru mampu menggunakan media pembelajaran berbasis augmented reality dalam pembelajaran bahasa Inggris dengan baik. Terdapat peningkatan hasil belajar siswa pada mata pelajaran bahasa Inggris setelah menggunakan media pembelajaran berbasis augmented reality. Sehingga dapat disimpulkan bahwa peningkatan tingkat kepuasan di kalangan pendidik dan siswa, mencerminkan lingkungan pembelajaran lebih menarik dan memuaskan.

## ABSTRACT

The role of language as the most important means of effective communication is universally recognized. In the context of education, students are expected to recognize the potential for acquiring English with the help of the media. Media is a tool for learning English. The use of media in learning English is minimal. The aim is to find out the results of applying augmented reality as a medium for learning English in elementary schools. The method in this research is mixed methods namely survey, observation, and documentation. The subjects of this study were a teacher and elementary school students in English subject. Data collection techniques, nonverbal in the form of pictures, assisted by recording techniques, with the listening method. Data collection instruments used questionnaires and interview sheets. Multimodal analysis techniques and interview results were collected, reduced, and concluded. The results of the study show that teachers can use learning media based on augmented reality in learning English well. There is an increase in student learning outcomes in English subjects after using augmented reality-based learning media. So, can be concluded that the increased satisfaction levels among educators and students, reflecting a more interesting and satisfying learning environment.

## 1. INTRODUCTION

One of the skills that must be mastered by the learners and especially young learners is the ability to understand conversations whose dialect was previously unknown (Alduais et al., 2022). This is evidenced by the many prerequisites that focus on Upcoming representatives who have unknown dialect abilities (Markowitz & Ansari, 2020). In Indonesia, the most concentrated unknown dialect is English (Phoocharoensil, 2022; Bashori et al., 2021). Recognizing the importance of mastering English, English illustrations have been given since the elementary school level (Hu & McGeown, 2020; Cenoz & Santos, 2020). At the Hang Tuah Elementary School in Medan, examples of English were given from grade I to grade

VI. However, not all students understand the importance of learning and mastering English. Some students hesitate to follow the illustrations well. Likewise, during the BDR training, several students did not submit the daily assignments given by the English instructor. This is enough to show that there are still a few students who do not understand the importance of learning English. In the BDR action, English educators deliver learning material in the form of recordings uploaded on YouTube, then provide daily assignments that students need to do and submit. Limitations of time, manpower, and office make English BDR practice boring, and will generally use similar learning media that can help students understand it. This makes some students feel tired and less motivated to participate in English learning activities (Suryana & Indrawati, 2018). Innovation based learning media is required with an end goal to confront the time of the Industrial Revolution 4.0 and Society 5.0 (Aquilani et al., 2020; Fukuda, 2020). Expanded Reality (AR) is one of the elective learning media that can answer the difficulties of the present turn of events. Valino made sense of that AR is an innovation that utilizes two-layered or potentially three-layered virtual items into a genuine climate and afterward extends these virtual articles progressively. Dissimilar to computer generated reality which totally replaces reality, increased reality essentially adds to or supplements reality. Virtual items show data that the client can't see with his own faculties. This makes increased reality reasonable as an instrument to help the discernment and communication of its utilization with this present reality. Data showed by virtual articles assists clients with completing exercises in reality (Manuli et al., 2020).

Saiful and Yoyok recommended that AR is an illustration of media created by PC innovation. AR is recognized in two ways in raising the item, to be specific AR utilizing markers (marker based) and without markers (marker less). Both are fit for delivering two-layered and three-layered objects, yet marker-based AR requires markers as pictures of complex and non-rehashing designs that should be printed first. So one might say that the media created utilizing this innovation is remembered for the media that is the consequence of a mix of PC and print innovation (Dwi et al., 2021). This AR learning media can stand out for understudies and make learning exercises more viable on the grounds that the item looks genuine to understudies in primary school. Three-layered (3D) objects consolidated into a genuine climate in light of cell phone applications make AR a reasonable and simple to-utilize medium. As per Atmajaya, AR in schooling has a positive effect, which is appealing for multi-modular picking up, expanding availability of instructive substance, expanding understudy command over instructive substance, opening up potential open doors for cooperative getting the hang of, propelling understudies to be effectively involved, and transforming something unique into concrete (Suryana & Indrawati, 2018). J. Bacca argues that AR-based learning applications have problems in their role in these applications related to the objectives and activities presented (Rovira, M. S., Turro, M. R., Fioretti, R. M. S., & Velilla, 2018). The role of most of the application of AR technology is only limited to interactive and visual elements without having a direction to conceptualized learning activities, even though learning activities have a very vital role in the success of learning objectives. Referring to some of these things, this literature review was compiled as an effort to find out technological developments in making AR learning media. Information related to the implementation of the use of AR in the world of education or non-education can be known in detail and factually

Learning English is felt to be necessary and important for children, considering that in this very advanced era, children should have been taught English learning or learning a second language other than their mother tongue, which is where to start learning English sometimes children will feel bored with learning methods that only use book media, even though the learning is only in the form of basics (Lumbantoruan, 2022). Children who are starting to enter the age of 6-11 years really like something that is interesting or has never been seen before, especially something that can be seen in real terms and contains elements of learning (Verawati & Desprayoga, 2019). If at this age you already have the ability to speak English well and correctly, then you can be sure that this ability will be used at the next level of education (Chien et al., 2020). As of now, an ever-increasing number of new advances are arising in the field of Information Technology (IT). These innovations are at present growing quickly. One innovation that is presently being created is Augmented Reality (AR). Increased Reality (AR) is an innovation used to join the virtual world and this present reality, this framework is nearer to the genuine climate, so the limit between the two turns out to be flimsy. [1] Augmented Reality plans to foster innovation that permits converging continuously, this innovation permits clients to see genuine 3D items utilizing a cell phone. [2] With the range of media that can use innovation as a guide in acquiring data, this is the reason for the readiness of this last undertaking (Ningsih, 2018). In reality on the ground, educators have not used this media as a means of developing students' knowledge. The gap between theory, expectations, and reality in the field makes this research very urgent to do. The creators designed an English learning application by utilizing Augmented Reality innovation by utilizing mobile media which encourages the provision of data and 3D views of existing objects. Usually, at this time children are getting bored with learning English by utilizing

the media of books, therefore the purpose of this study is to find out how to implement effective Augmented Reality (AR) in English Learning in Elementary Schools.

## 2. METHOD

The method in this study is the Mixed Methods method, namely surveys and observations and documentation. Research summarizes, records, and listens to all input from respondents. Research also uses exploratory methods with this kind of objective in subjective testing using interesting subjective methodologies (Rambe, 2019). The subjects in this research were elementary school English lessons and the objects were teachers and students in elementary schools in Pekanbaru. Data collection techniques by collecting information in reviews in the form of general information such as pictures from video accounts obtained when educators appear during the learning process in the study room. The information and data obtained are then broken down by Kress and Leeuwen's multimodal hypothesis to find out how nonverbal correspondence types are carried out, namely educator signals in training and learning exercises using listening strategies and assisted by using note-taking procedures (Sugiyono, 2017). In subjective exploration, scientists are straightforwardly associated with the most common way of gathering information. The place of the scientist in subjective exploration isn't just as an organizer yet in addition as an agent of information assortment or as an instrument (Sari, 2020). To gather information in this review, the specialist utilized the referential technique. The listening strategy is a technique that is completed by listening which is lined up with the perception technique (Sugiyono, 2015).

This study uses multimodal analysis. The multimodal analysis discussed in this paper uses the theory of functional systemic linguistics (LSF) (Meneses, 2018). The multimodal analysis model was developed from a combination of multimodal theory and multimodal analysis by Kress and Leeuwen. In multimodal examination as per Anstey and Bull expresses that a text is called multimodal on the off chance that the text is acknowledged from a mix of at least two semiotic frameworks (Syamsuar, 2018). As per them, there are five multimodal semiotic frameworks in a text, in particular: 1) Linguistic: jargon, conventional construction and the sentence structure of oral and composed language, 2) Visual: variety, vectors and perspective in still and moving pictures, 3) Audio: volume, pitch and mood of music and audio effects, 4) Gesture: development, speed and tranquility in look and non-verbal communication, and 5) Spatial: vicinity, bearing, position of format and association of items in space (Murica, 2018).

The analysis technique with the listening strategy applied in this review includes the accompanying methods: (1) recording procedure, in this case, the researcher records learning exercises in elementary school classes by using a cell phone that has a screen. 5.2 fours with support for super AMOLED boards and QUAD HD targets. The engine uses the Qualcomm Snapdragon 820 chipset. This processor is supported by 4GB of RAM so that the performance is very fast and comfortable when recording videos and can capture sound and images clearly and correctly. Then the recording is changed over into a picture. The outcomes are arranged by the request for time. In the information arrangement, information coding is given (information code), in particular italics and striking letters. Likewise, the date and month of distribution are additionally composed with a foreordained code. This was finished to make it more straightforward to sort the information. What's more, utilized as examination proof. In this data analysis technique, the research summarizes all data from observing the process of implementing English learning. All data was collected and analyzed and aligned with findings during interviews and documentary evidence obtained by research during implementation in English learning classes.

## 3. RESULT AND DISCUSSION

### Result

Based on observations and results of documentary evidence, it appears that the media in this study has been used effectively in teaching English in elementary schools. The following are the forms and models outlined in the learning media.



Figure 1. School Students



Figure 2. Records of School Students

The picture above is a picture of 2 students having a dialogue in English, then the picture above will be scanned with the application. So that a video of what kind of conversation they discussed by the two people will appear, as shown in Figure 1 and Figure 2, so that students can record the English vocabulary spoken by each person in the dialogue, then other students can easily learn it and repeat the pronunciation, by the two people, the word is in accordance with what is in the dialogue. This finding is in line with previous research which says that every conversation can be repeated by recording it and giving it to be studied by different people (O'Brien et al., 2020; Bates et al., 2020; Seuren et al., 2021).

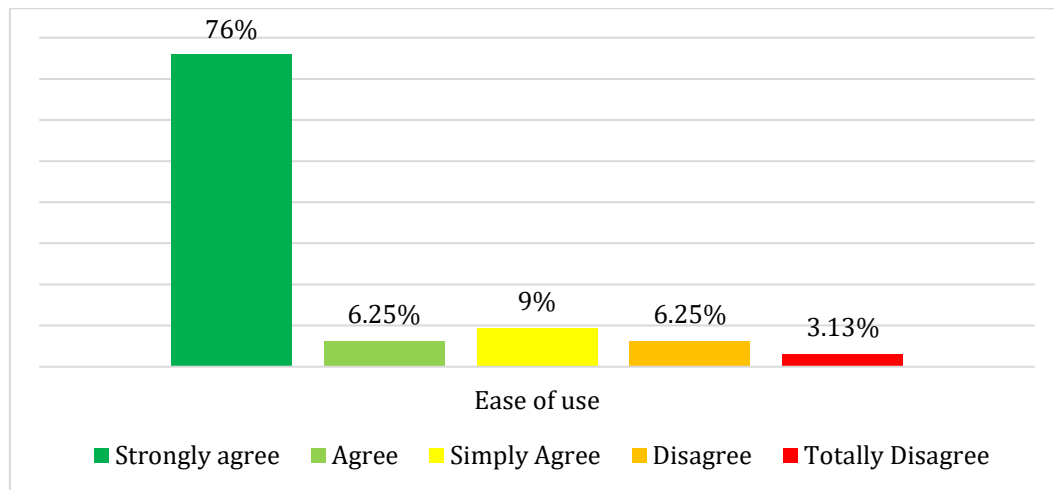


Figure 3. Ease of Use by Students

Based on student assessments, it can be seen in Figure 3 that there are 76% and 6.25% of students who strongly agree and agree with the ease of using AR media in helping English conversations. Elementary school students are very helpful and make it easier for elementary school students to repeat missed conversations.

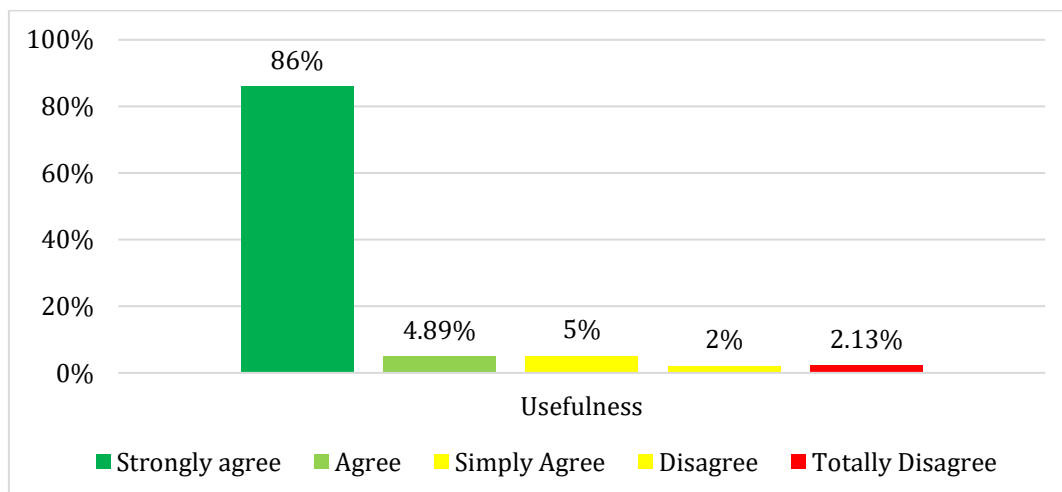


Figure 4. Usefulness by Students

Elementary school level students considered that a large number of them used this media in English dialogue conversations. From Figure 4 it can be seen that there are 86% who strongly agree with using AR media and 4.89% agree with the use of this English dialogue recording tool. This shows that the interest of elementary school students has a fairly high interest in using this conversational media.

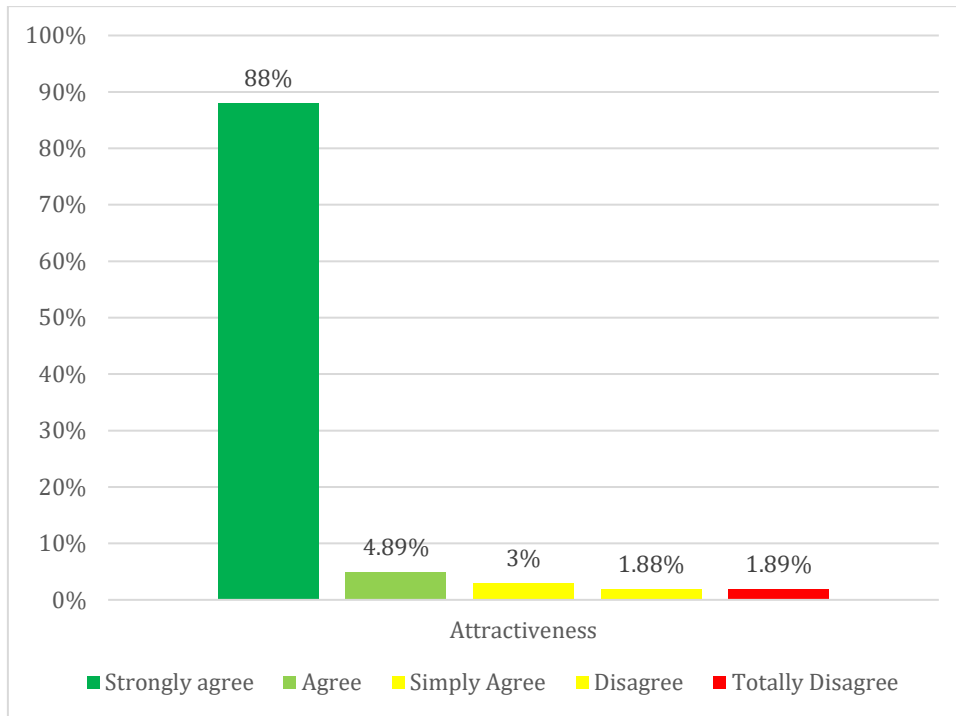


Figure 5. Attractiveness by Students

Figure 5 shows that there are 88% who strongly agree with students who assess interest in the way of dialogue and repeating conversations by recording using AR media. Students who judge agree there is 4.89%. In total there are 92.89% who are interested in using this method.

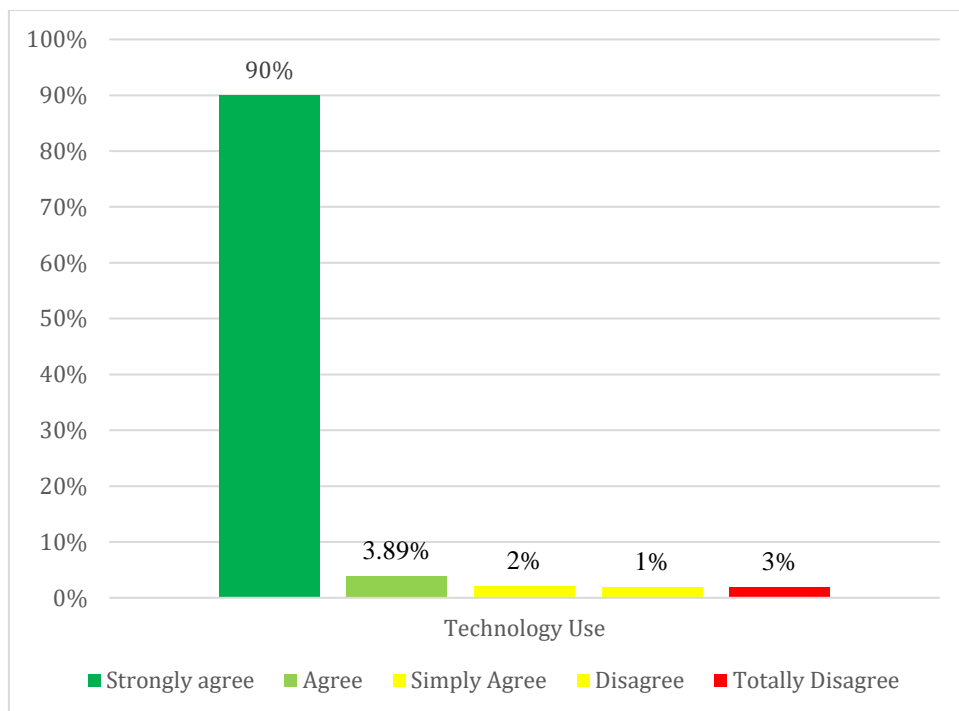


Figure 6. Technology Use by Students

The high use of technological media by students is very high. Seen in Figure 6, there are 90% and 3.89% who strongly agree and agree with the high use of technological media in helping students to communicate in English. This has a positive impact on the development of students' vocabulary to better understand English.

## Discussion

The findings in this study are in line with previous studies. In previous studies, it was seen that elementary school students in learning English had to be assisted by printed media designed by the teacher (Li, 2020; Huang et al., 2020; Cheng et al., 2020). Research shows that AR media can be used as a communication tool (Kaya, 2020; Rao et al., 2020). Based on the results of the pre-test and post-test showed an increase in students' English vocabulary skills. The augmented reality-based product provided is, through the image below. In the survey, it can be seen that the respondents considered the use of AR media in assisting the English learning process in elementary schools strongly agreed with the respondents who strongly agreed that 76%. While the respondents also responded to the indicators in Figure 5 that there were 86% strongly agreed that learning English should be assisted by the media. From Figure 6, it can be seen that the respondents rated that they strongly agreed as much as 88% liked the dialogue method used in AR. The students also have a fairly high interest in using technology as a source of learning English, there are 90% of students who strongly agree. The pre-test and post-test were used as instruments to measure differences in students' English vocabulary scores before and after using AR. The results of the statistical descriptive analysis showed that the pre-test average score of the English vocabulary of fourth-grade students who attended the training was high (mean = 87.00; SD = 11.64; SE = 1.97), while the post-test results showed a very high increase. (Mean = 91.71; SD = 10.77; SE = 1.82). This finding is in line with previous research which said that the use of AR can improve students' understanding of English (Hussein et al., 2020; Parmaxi & Demetriou, 2020; Thees et al., 2020).

The difference between the pre-test and post-test mean scores is 4.71. The data findings show that there are differences in the results of the English vocabulary skills of grade IV elementary school students before and after the application of Augmented Reality in the classroom. In addition, an analytical test was carried out to find out whether the data obtained was normal and homogeneous. The results of the analysis test obtained the amp value. sig. (2-tails) = 0.00. Because the value of 0.00 is smaller than <0.05, it can be concluded that the data is not normally distributed. Because the data were normally distributed, the analysis was carried out using the Wilcoxon test to determine the significance of the differences in the pre-test and post-test scores of applying AR to the English vocabulary mastery skills of elementary school students. The first result of the Wilcoxon test is ranking, especially positive ranking or difference (positive) between the pretest and posttest results. There are 22 positive data (N) which means that 22 students experienced an increase in English vocabulary learning outcomes from pre-test to post-test scores. The average result of increasing the rank of understanding is 14.93, while the number of positive powers or the number of powers is 328.50. In addition, based on the output of Test Statistics, it is known that Asymp Sig (2-tailed) is 0.014, less than < 0.05, it can be concluded: "H<sub>a</sub> is accepted". This means that there is a significant difference between the results of learning English vocabulary on the pre-test and post-test scores. Thus, it can also be concluded that there is an effect of the application of Augmented Reality on the results of learning English vocabulary for fourth-grade elementary school students.

The results of the analysis show that Augmented Reality can be used as an alternative learning medium to increase understanding and knowledge of learning English vocabulary. The English subject teacher plays a role in making learning implementation plans, making materials and media as learning aids, and making effective learning videos. In addition, the English subject teacher also helps in coordination, student discussions with other students, and questions and answers between the service team and service participants. Another party that plays a role is the guardian of the fourth-grade students. Parents of students always accompany their children in participating in the activities provided in this service program. At the implementation stage which was carried out online through a Zoom meeting, the principal, of Hang Tuah Medan Elementary School gave a speech and motivated the participants. In addition, English teachers are also directly involved in the implementation of this program by providing material reviews to service participants. Parents also accompany and guide their children during Zoom meetings. The results of this study indicate that there are differences in student learning outcomes before and after using Augmented Reality-based learning media implemented at the Hang Tuah public elementary school in Medan. In addition, the use of AR media also has a positive impact on teachers and students because teachers and students are more enthusiastic about learning and because the learning process becomes more interesting. In addition, it also received a positive response from parents who showed a positive response in helping students in dialogue in English, because, through the augmented reality application, students increasingly liked learning English as shown by the activeness of students in discussions and increased understanding and mastery of English vocabulary. This is in line with previous research which said that increasing English vocabulary starts from the activeness of students in dialogue with each other (Desmiyanti et al., 2020; Badem-Korkmaz & Balaman, 2020; Yang et al., 2020).

The questionnaire given was filled out by students and teachers in elementary schools. Filling out the questionnaire was carried out after finishing using augmented reality learning media, so that the results

of the study were obtained, namely: A score of 87 for the ease-of-use indicator with good interpretation, 95 for the usefulness indicator with very good interpretation, 90 for the attractiveness indicator with very good information, 96 for indicators of technology use with excellent descriptions. So, it can be seen that the use of augmented reality in learning English in schools is appropriate to use and respond to properly, and according to teachers and students, it is very good if it is applied in elementary schools on a larger scale. This finding is in line with previous research, that augmented reality is very good for learning English (Parmaxi & Demetriou, 2020; Danaei et al., 2020; Che Dalim et al., 2020).

The implication of this research is to find appropriate and effective methods for elementary school students to help them learn English better. The impact is that the knowledge, understanding, and improvement of learning outcomes for elementary school students are getting better. The weakness of this study is that research recommends further research be carried out in the form of mass trials on a larger scale so that it will be seen whether the results found in this study are in line with the responses and interests of other elementary school students.

#### 4. CONCLUSION

There was an increase in the learning outcomes of fourth-grade elementary school students in English subjects after using augmented reality-based learning media. Based on the results of the pre-test and post-test, the average pre-test score for the English vocabulary of elementary school students who attended the training was high, while the post-test results showed a very high increase. The findings in this study received positive responses from students, teachers, and parents, learning English with Augmented Reality media can make learning more fun so that students understand the subject matter more easily. Based on filling out the questionnaire conducted by the teacher and students, the indicators for the ease of use of information were good, the indicators for the usefulness of information were very good, the indicators for the attractiveness of information were very good, and the indicators for using technology with information were very good. So, it can be seen that the use of augmented reality in learning English in schools is appropriate to use and respond well to, and according to teachers and students, it is very good if applied in elementary schools. This study implies that the method in its findings attracts students' interest in learning more effectively and attracts students' interest in independent learning in English lessons. Weaknesses of the research, this research has not been tested on a larger scale with elementary school students, to see whether the media and dialogue used can increase understanding, attract interest, and improve learning outcomes of elementary school students in other schools.

#### 5. REFERENCES

- Alduais, A., Al-Qaderi, I., & Alfadda, H. (2022). Pragmatic Language Development: Analysis of Mapping Knowledge Domains on How Infants and Children Become Pragmatically Competent. *Children*, 9(9), 1–41. <https://doi.org/10.3390/children9091407>.
- Aquilani, B., Piccarozzi, M., Abbate, T., & Codini, A. (2020). The role of open innovation and value co-creation in the challenging transition from industry 4.0 to society 5.0: Toward a theoretical framework. *Sustainability (Switzerland)*, 12(21), 1–21. <https://doi.org/10.3390/su12218943>.
- Badem-Korkmaz, F., & Balaman, U. (2020). Third position repair for resolving troubles in understanding teacher instructions. *Linguistics and Education*, 60(December 2020), 100859.1-13. <https://doi.org/10.1016/j.linged.2020.100859>.
- Bashori, M., van Hout, R., Strik, H., & Cucchiaroni, C. (2021). Effects of ASR-based websites on EFL learners' vocabulary, speaking anxiety, and language enjoyment. *System*, 99(July 2021), 102496.1-16. <https://doi.org/10.1016/j.system.2021.102496>.
- Bates, V., Hickman, C., Manchester, H., Prior, J., & Singer, S. (2020). Beyond landscape's visible realm: Recorded sound, nature, and wellbeing. *Health and Place*, 61(November 2019), 102271.1-7. <https://doi.org/10.1016/j.healthplace.2019.102271>.
- Cenoz, J., & Santos, A. (2020). Implementing pedagogical translanguaging in trilingual schools. *System*, 92(August 2020), 102273.1-9. <https://doi.org/10.1016/j.system.2020.102273>.
- Che Dalim, C. S., Sunar, M. S., Dey, A., & Billinghamurst, M. (2020). Using augmented reality with speech input for non-native children's language learning. *International Journal of Human Computer Studies*, 134(February 2020), 44–64. <https://doi.org/10.1016/j.ijhcs.2019.10.002>.
- Cheng, L., Antonenko, P. D., Ritzhaupt, A. D., Dawson, K., Miller, D., MacFadden, B. J., Grant, C., Sheppard, T. D., & Ziegler, M. (2020). Exploring the influence of teachers' beliefs and 3D printing integrated STEM instruction on students' STEM motivation. *Computers and Education*, 158(April), 103983.1-18. <https://doi.org/10.1016/j.compedu.2020.103983>.

- Chien, S. Y., Hwang, G. J., & Jong, M. S. Y. (2020). Effects of peer assessment within the context of spherical video-based virtual reality on EFL students' English-Speaking performance and learning perceptions. *Computers and Education*, 146(March 2020), 103751.1-48. <https://doi.org/10.1016/j.compedu.2019.103751>.
- Danaei, D., Jamali, H. R., Mansourian, Y., & Rastegarpour, H. (2020). Comparing reading comprehension between children reading augmented reality and print storybooks. *Computers and Education*, 153(April), 103900.1-10. <https://doi.org/10.1016/j.compedu.2020.103900>.
- Desmiyanti, D., Yuanita, Y., & Anwar, K. (2020). Make a Match Learning for English Conversation Skills of Students with Intellectual Disabilities. *Script Journal: Journal of Linguistics and English Teaching*, 5(1), 23-31. <https://doi.org/10.24903/sj.v5i1.378>.
- Dwi, S., Eko, R., Adi, K. R., & Ratnawati, N. (2021). Pengembangan Media Evaluasi Pembelajaran IPS "MAPS" dengan Game Web Browser Based Learning untuk siswa SMP Development of Social Studies Evaluation Media "MAPS" with Game Web Browser Based Learning for Junior High School Students. 25-42. <https://doi.org/10.15548/jpips.v8i1.12266>.
- Fukuda, K. (2020). Science, technology and innovation ecosystem transformation toward society 5.0. *International Journal of Production Economics*, 220(April), 107460.1-14. <https://doi.org/10.1016/j.ijpe.2019.07.033>.
- Hu, X., & McGeown, S. (2020). Exploring the relationship between foreign language motivation and achievement among primary school students learning English in China. *System*, 89(April 2020), 102199.1-10. <https://doi.org/10.1016/j.system.2020.102199>.
- Huang, S. Y., Kuo, Y. H., & Chen, H. C. (2020). Applying digital escape rooms infused with science teaching in elementary school: Learning performance, learning motivation, and problem-solving ability. *Thinking Skills and Creativity*, 37(129), 100681.1-17. <https://doi.org/10.1016/j.tsc.2020.100681>.
- Hussein, E., Daoud, S., Alrabaiah, H., & Badawi, R. (2020). Exploring undergraduate students' attitudes towards emergency online learning during COVID-19: A case from the UAE. *Children and Youth Services Review*, 119(December 2020), 105699.1-21. <https://doi.org/10.1016/j.childyouth.2020.105699>.
- Kaya, T. (2020). The changes in the effects of social media use of Cypriots due to COVID-19 pandemic. *Technology in Society*, 63(April), 101380.1-7. <https://doi.org/10.1016/j.techsoc.2020.101380>.
- Li, M. (2020). Multimodal pedagogy in TESOL teacher education: Students' perspectives. *System*, 94(November 2020), 102337.1-13. <https://doi.org/10.1016/j.system.2020.102337>.
- Lumbantoruan, J. H. (2022). Mathematics Module Development Derivative Materials Christian University Of Indonesia, Jakarta, Indonesia E-Mail: Abstract Introduction In Purwaningsih's Research, (2016) It Was Seen That There Was An Increase In Student Activity In Learning Assisted By modules. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(4), 2593-2609. <https://doi.org/http://dx.doi.org/10.24127/ajpm.v11i4.5716>.
- Lumbantoruan, J. H., & Nadeak, B. (2022). Mathematics teacher competency analysis during online learning. *International Journal of Trends in Mathematics Education Research*, 5(2), 214-221. <https://doi.org/10.33122/ijtmr.v5i2.132>.
- Manuli, A., Maggio, M. G., Latella, D., Cannavò, A., Balletta, T., De Luca, R., Naro, A., & Calabrò, R. S. (2020). Can robotic gait rehabilitation plus Virtual Reality affect cognitive and behavioural outcomes in patients with chronic stroke? A randomized controlled trial involving three different protocols. *Journal of Stroke and Cerebrovascular Diseases*, 29(8), 1-9. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.104994>.
- Markowitz, A. J., & Ansari, A. (2020). Changes in academic instructional experiences in Head Start classrooms from 2001-2015. *Early Childhood Research Quarterly*, 53(Quarter 2020), 534-550. <https://doi.org/10.1016/j.ecresq.2020.06.008>.
- Meneses. (2018). The effects of multimodal texts on science reading comprehension in Chilean fifth-graders: Text scaffolding and comprehension skills. *International Journal of Science Education*, 40(18).
- Murica. (2018). Interactive and multimodal pedagogy: A case study of how teachers and students use interactive whiteboard technology in primary science. *Australian Journal of Education*, 58(1), 74-88.
- Ningsih. (2018). Pengaruh perkembangan revolusi industri 4.0 dalam dunia teknologi Pendidikan di indonesia. *Jurnal Fakultas Komputer*, 1-12.
- O'Brien, R., Beeke, S., Pilnick, A., Goldberg, S. E., & Harwood, R. H. (2020). When people living with dementia say 'no': Negotiating refusal in the acute hospital setting. *Social Science and Medicine*, 263(June), 113188.1-10. <https://doi.org/10.1016/j.socscimed.2020.113188>.
- Parmaxi, A., & Demetriou, A. A. (2020). Augmented reality in language learning: A state-of-the-art review of 2014-2019. *Journal of Computer Assisted Learning*, 36(6), 861-875.



- <https://doi.org/10.1111/jcal.12486>.
- Phoocharoensil, S. (2022). ELT and AL Research Trends in Thai SCOPUS-indexed Journals. *Pasaa*, 64(December), 163–193. <https://eric.ed.gov/?id=EJ1376445>.
- Rambe, R. . (2019). *Analysis Multimodal In School* (Cendekia Press (ed.)).
- Rao, H. R., Vemprala, N., Akello, P., & Valecha, R. (2020). Retweets of officials' alarming vs reassuring messages during the COVID-19 pandemic: Implications for crisis management. *International Journal of Information Management*, 55(June), 102187.1-6. <https://doi.org/10.1016/j.ijinfomgt.2020.102187>.
- Rovira, M. S., Turro, M. R., Fioretti, R. M. S., & Velilla, M. C. (2018). Multimodal Campus Project: Pilot Test of Voice Supported Reading. *Procedia - Social and Behavioral Sciences*, 190, 190–197.
- Sari, S. . (2020). Analisis Multimodal. *Journal Of Reflection : Economic, Accounting, Management Business*, 3, 291–300.
- Seuren, L. M., Wherton, J., Greenhalgh, T., & Shaw, S. E. (2021). Whose turn is it anyway? Latency and the organization of turn-taking in video-mediated interaction. *Journal of Pragmatics*, 172(January 2021), 63–78. <https://doi.org/10.1016/j.pragma.2020.11.005>.
- Sugiyono. (2015). *Metode Penelitian dan pengembangan*. Alfabeta.
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, kualitatif dan R&D*. Alfabeta.
- Suryana & Indrawati. (2018). Pengembangan Media Pembelajaran Berbasis Permainan Tradisional “Geprek Kaleng” untuk menanamkan konsep Pecahan Siswa Kelas III SD. *JPGSD Surabaya*, 06(03), 219-228.
- Syamsuar, & R. (2018). Pendidikan Dan Tantangan Pembelajaran Berbasis Teknologi Informasi Di Era Revolusi Industri 4.0. *E-Tech : Jurnal Ilmiah Teknologi Pendidikan*, 6(2).
- Thees, M., Kapp, S., Strzys, M. P., Beil, F., & Lukowicz, P. (2020). Computers in Human Behavior Effects of augmented reality on learning and cognitive load in university physics laboratory courses. *Computers in Human Behavior*, 108(July 2020), 106316.1-11. <https://doi.org/10.1016/j.chb.2020.106316>.
- Verawati dan Desprayoga. (2019). Solusi Pembelajaran 4.0: Hybrid Learning. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgri Palembang*, 1183–1192.
- Yang, Q. F., Chang, S. C., Hwang, G. J., & Zou, D. (2020). Balancing cognitive complexity and gaming level: Effects of a cognitive complexity-based competition game on EFL students' English vocabulary learning performance, anxiety and behaviors. *Computers and Education*, 148(December 2019), 103808.1-21. <https://doi.org/10.1016/j.compedu.2020.103808>.