

Improving Digital Literacy and Student Learning Results In Border School

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Abstract

This study aims to improve digital literacy and learning results using Augmented Reality applications developed by the Pusdatin Ministry of Education, Culture, Research and Technology and Education Game Gernasila, a learning innovation created by researchers in the form of android applications. The method used is Classroom Action Research (CAR), as many as two cycles. Samples was 18 students in grade II at SDN 29 Idai, Sintang Regency, West Kalimantan, Indonesia. The stages of research referring to CAR using Kemmis and McTaggart model include; planning, action, observation, and reflection. Meanwhile, The data collection techniques used in this study used tests and observation sheets for learning activities. The data obtained are then analyzed descriptively and qualitatively by calculating the scores obtained by students, calculating the average value of completeness of each Cycle. The results showed that the average student learning results in Cycle I were 60, while in Cycle II, it increased to 80. The average observation results of Augmented Reality in Cycle I were 70%, while the results of using the education game gernasila in Cycle II were 90%. The difference between Cycle 1 and Cycle 2 is 20%. It can be concluded that Augmented Reality developed by the Pusdatin of the Ministry of Education and Culture and Edugame Gernasila can improve student learning results and digital literacy in schools located in underdeveloped areas and the borders of Indonesia.

Keywords: Digital Literacy; Augmented Reality; Gernasila; Border School

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Introduction

The development of technology today has developed very rapidly, and Indonesia has now entered the era of the Industrial revolution 4.0. It will soon go to the period of the industrial revolution 5.0. Today's rapid technological changes have encouraged teachers to improve the ability and mastery skills of Information and Communication Technology (ICT) that can use to improve the quality of learning. This opinion is similar to the statement (Bond et al., 2018), which states that in developed countries such as Germany, 99% of students already have internet and smartphone devices at home and have digital devices to support student learning activities when at home.

Various studies related to implementing innovative learning media in learning in schools, as has been done by (Arsal et al., 2019), state that the development of E-Module learning media on circulatory system material is effective for use in class XI. Meanwhile, (Juwita et al., 2020) said that learning media using the Prezi application, equipped with a guidebook on biodiversity material, can be used for Biology lessons in class X. Meanwhile, advances in science and technology encourage teachers to continue to develop technological capabilities, creativity, innovation, and developing media to create exciting learning for students, even in limited conditions.



Figure 1. Students of SD Negeri 29 Idai are working on questions at student worksheet

The package book used at SD Negeri 29 Idai so far is just a package book obtained from purchases using the allocation of School Operational Assistance funds, for printed teaching materials such as student worksheet. Meanwhile, the conditions at SD Negeri 29 Idai, with the absence of PLN electricity and the lack of signal, caused students not to know exciting media. The only media often used is real media or original media and media such as student worksheet printed by teachers. Natural or authentic media is often used in learning because the school is under a hill and surrounded by forests, so that learning can be done outdoors. Based on these conditions, researchers are trying to use one of the technologies currently developed by Pusdatin Ministry of Education, Culture, Research and Technology, Augmented Reality. Meanwhile, researchers also developed an Education game Gernasila, that can be accessed offline for thematic learning in elementary schools.

Augmented reality combines real and virtual objects in a natural environment (Irfansyah, 2017). Meanwhile (Nurhidayanti et al., 2022) showed that the independence of SMP N 2 students with discovery learning assisted by LKPD with Augmented Reality obtained a percentage of 70% in the medium category so that in practice, the use of Augmented Reality still requires teacher assistance. In line with (Ozdemir et al., 2018), the application of Augmented Reality increases student academic achievement in the learning process compared to traditional methods, so Augmented Reality can be an alternative digital learning media for teachers in schools.

An educational game was developed by incorporating educational content so students can learn while playing. Various studies related to educational games, such as research conducted (Yulia et al., 2019), state that learning media packaged in the form of educational games in mathematics can increase student interest in learning, sharpen student abilities, and train students' memory in arithmetic. In a similar opinion (Utami & Hardini, 2021), developing digital literacy learning media based on educational games can help elementary school students read through puzzle games.

The differences between the research that has been carried out and the previous research are: (1) The school's location is where the research is carried out in SD Negeri 29 Idai. (2) The media used in this study is Augmented Reality "Cita-Citaku" from Pusdatin Ministry of Education, Culture, Research and Technology and Edugame Gernasila, which researchers developed through a game builder application from Quickappninja.com. (3) This best practice measures the increase in digital literacy of grade II students of SD Negeri 29 Idai. So the purpose of this study is; (1) To find out the increase in digital literacy of SD Negeri 29 Idai students after using Augmented Reality media and Edugame Gernasila media. (2) To determine the improvement in students' learning results of SD Negeri 29 Idai after using Augmented Reality and Edugame Gernasila.

Methods

The research methods used are Classroom Action Research using the Kemmis and McTaggart model in (Garinalis et al., 2018) which includes four stages, namely; (1) Planning (drafting actions); (2) Action; (3) Observing; (4) Reflecting. The subject of best practice is 18

elementary school grade II students, consisting of 12 girls and six boys. Classroom Action Research (CAR) activities are carried out in two cycles, with the minimum completion criteria for each Cycle being 70. An indicator of the success of Classroom Action Research implemented is that the improvement of cognitive learning results of students must meet the minimum completeness criteria > 75%. The second indicator is the increase in digital literacy at the end of the 2nd Cycle.

The Class Action Research method, where the details of the activities that have been carried out are; (1) In the preparatory stage, where at this stage the researcher uses the Augmented Reality application that has provided by Pusdatin Learning House of the Ministry of Education and Culture, which has previously been downloaded from the play store and installs the education game gernasila application on the teacher's device; (2) Learning planning stages which include: making plan activities, printing markers, making question grids, making questions, and making observation sheets; (3) Carry out classroom learning using the Augmented Reality application using printed markers, as well as carry out learning using the education game gernasila; (4) Carry out observation of learning activities, tests, and reflections on the learning that has been conducted.

Reflections from the tests carried out are then used to determine whether the indicators of the success of the implementation of Classroom Action Research (CAR) have been achieved. The data collection techniques used in this study used tests and observation sheets for learning activities. The data obtained are then analyzed descriptively and qualitatively by calculating the scores obtained by students, calculating the average value of completeness of each Cycle. The data obtained are further described and concluded based on predetermined criteria.

Results and Discussion

The use of Augmented Reality that Pusdatin Ministry of Education, Culture, Research and Technology has developed is an innovation that is feasible to implement in learning, where researchers have previously conducted trials using Augmented Reality and Markers along with the Gernasila Education game application before conducting Classroom Action Research in Class II of SD Negeri 29 Idai. Meanwhile, SD Negeri 29 Idai does not have access to electricity from PLN, but the source of electricity is obtained from the Solar Power Plant (PLTS) installed in the school. Based on the initial trial results, the Gernasila Augmented Reality and Education game can run smoothly on the teacher's device without requiring internet access (offline), so it is very suitable for use as a learning medium in areas where there is no internet network. The theme used in this study is the theme of deals and open subject matter, where in this theme, students will learn various types of work such as teachers, doctors, soldiers, pilots, and various other jobs. Students also learn PPKn material about implementing the concept of Pancasila in everyday life.

The use of Augmented Reality media in cycle 1, which continued with Edugame Gernasila in cycle 2, has received an excellent response. This can be seen in the learning carried out. Students take turns learning to use the teacher's gadget to see animation in 3 dimensions from the Augmented Reality application. It can be seen that the students are motivated and take turns learning to read the text that appears on the gadget screen. The learning process can be seen in Figure 2 and Figure 3.



Figure 2. Digital literacy activities using Augmented Reality at SDN 29 Idai



Figure 3. Digital literacy activities using Edugame Gernasila at SDN 29 Idai

Based on the cognitive assessment results in Cycle 1, an average score of 60, while in Cycle 2, an average value of 80. The highest value in the 1st Cycle is 85, while the 2nd Cycle is 90. The lowest value on the 1st Cycle is 40, and the 2nd Cycle is 70. Meanwhile, after using the Augmented Reality application from the Pusdatin of the Ministry of Education and Culture and the Education game Gernasila carried out by grade II students of SD Negeri 29 Idai, the digital literacy assessment results can see in Table 1.

No	Observed Digital Literacy	Media used	
		Augmented Reality	Education Game Gernasila
1	Student's ability to use gadgets and applications they use (Ability to use hardware and software)	80%	90%
2	The ability of students to collaborate in groups when using gadgets (Ability to collaborate)	60%	88%
3	Student's ability to communicate with colleagues in groups when using gadgets (Ability to communicate)	70%	93%
4	Students' ability to solve problems in groups (Ability to solve the problems)	70%	90%
Average Digital Literacy		70%	90%
Difference between Cycle 1 and Cycle 2		20%	

The obstacles experienced in learning using Augmented Reality developed by the Pusdatin Ministry of Education, Culture, Research and Technology are: (1) Limited device owned by teachers cause students to take turns using gadgets to scan markers that have been printed; (2) Unstable internet signal and even frequent absence of a signal on the device of device, causing problems in downloading and installing Augmented Reality; (3) Unfavorable weather conditions cause solar panels as a source of electricity in schools to be unable to turn on computer devices and printers, where a power source is needed to print previously downloaded markers that will use for classroom learning.

The solutions that have been carried out to overcome these technical obstacles are; (1) Download the Augmented Reality application and marker on the teacher's device in a neighboring village with a more stable internet signal on foot and can be reached for approximately 1 hour 30 minutes.(2) optimize marker printing during the day, where the school's solar power plant can be optimized to drive computer devices and printers.

Learning using Augmented Reality can motivate students to gain knowledge of various types of work that students dream of or aspire to through 3-Dimensional animated shows. The existence of an exciting image equipped with text is felt to be more attractive so that students can connect the information they receive with the reality that exists in everyday life. This opinion is in line with (Ozdemir et al., 2018), who state that Augmented Reality (AR) allows virtual objects generated by computers to be placed on physical objects in real time that can be used in classroom learning. Augmented Reality in learning allows students to explore the world interactively and collaboratively because Augmented Reality technology allows students to be able to watch 3-Dimensional videos, sounds, and images in real-time (Syawaludin et al., 2019). The results show that using innovative technology-based media in learning is indispensable. This opinion is similar to the results of a published study (Priyani, 2022), which states that the use of eclipse crossword media rocky learning house applications to improve students' science literacy. The use of PhET simulation-based mathematical logic practicum modules to improve students' reasoning skills (Prihatin & Oktaviana, 2020).

Digital literacy in each Cycle has progressed; this can be seen from the average value of the percentage of digital literacy in Cycle I only reached 70% and increased when in Cycle II it became 90%, so the difference between Cycle I and cycle II was 20%. The results of this study show that the increase in digital literacy is because students are used to using gadgets lent by teachers for learning. Students feel happy and more motivated to learn through gadgets than when they do questions from the STUDENT WORKSHEET book. Research (Yunus et al., 2015) states that using the Desktop-based "Taimer Island" educational game in elementary school students can provide a new nuance in the world of learning and increase the interest of elementary school children to learn. From the results of the observations, it can be seen that students communicate with each other, trying to contribute by giving the correct answers to their friends and even alternately using a device to try to answer questions on the gernasila application. The results are in line with (Safitri et al., 2020) that digital literacy covers a person's technical ability to use ICT tools or tools and includes one's knowledge and skills in understanding content to be able to create new knowledge.

The learning results in the 1st Cycle have been good, but they have not been optimal, and only a few students have completed it. Based on the results of the reflection, the obstacles that occur in the 1st Cycle are that students need to be used to using gadgets that have to install with the Augmented Reality application, so they have not been able to optimize student learning results. While in the 2nd Cycle, an average learning results of 80, this value is better when compared to the 1st Cycle, which only obtained an average score of 60. The research results align with (Kinanti, 2021) where Augmented Reality is efficient for use in learning and can improve student learning results at SMA Negeri 1 Kalisat. A similar opinion (Utami & Hardini, 2021) that digital literacy learning media based on educational games can help elementary school students read through puzzle games.

Conclusion

The conclusions from the research that has been done are; (1) There is an increase in digital literacy of class II students after using the Augmented Reality application developed by the Ministry of Education and Culture Pusdatin, Research and Technology, and Edugame Gernasila, where there is an increase in digital literacy in the ability to use hardware and software by 10%, Ability to collaborate by 28%, Ability to communicate by 23%, Ability to solve problems by 20%. (2) The use of Augmented Reality developed by Pusdatin Kemdikbud and Edugame Gernasila can improve the learning outcomes of class II students at SD Negeri 29 Idai from an average of 60 in cycle 1 to an average of 80 in cycle 2.

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