Feasibility of Developing Creative Mathematics Learning Media Augmented Reality Building Materials

by Nur Agus Salim

Submission date: 18-Dec-2023 04:47AM (UTC-0500)
Submission ID: 2261798456
File name: B9.pdf (3.57M)
Word count: 4887
Character count: 27335

TECHNIUM
SOCIAL SCIENCES JOURNAL

Technium.

40/2023

2023

A new decade for social changes

Technium Social Sciences

Powered by PLUS COMMUNICATION
International Communication & PR

TECHNIUM SOCIAL SCIENCES JOURNAL

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

Feasibility of Developing Creative Mathematics Learning Media Augmented Reality Building Materials

Sukriadi[1], Kusdar[2], La Djangka[3], Muhlis[4], Dyna Febiola[5], Nur Agus Salim[6]

[12345] Faculty of Teacher Training and Education, Mulawarman University, [6] Faculty of Teacher Training and Education, Widya Gama Mahakam Samarinda University

sukriadi@fkip.unmul.ac.id, kusdar@fkip.unmul.ac.id, la.djangka@fkip.unmul.ac.id, muhlis@fkip.unmul.ac.id, dynafebiola10201@gmail.com, nuragussalim@uwgm.ac.id

Abstract. This study aims to determine the feasibility of Augmented Reality Creative Mathematics learning media for geometric materials in elementary schools. The development of Augmented Reality Creative Mathematics learning media uses research and development methods or Research & Development, which produces a three-dimensional learning media using Augmented Reality technology in the Assemblr Edu application. This research and development use the ADDIE development model, which includes 5 development steps, namely: 1) analysis, namely needs analysis; 2) design, namely design or planning; 3) development, namely development; 4) implementation, namely implementation and 5) evaluation, namely evaluation. Based on the feasibility test results, it can be concluded that the Augmented Reality Creative Mathematics media is suitable for use as a learning medium for geometric materials in class V SDIT Istiqamah Balikpapan.

Keywords. Development, Media, Augmented Reality Creative Mathematics, Assemblr Edu

Introduction

Learning in the 21st century is now experiencing changes in early 2020 due to the coronavirus pandemic, which has caused the learning system to be carried out online from home. Some are carried out in combination according to pandemic conditions. Learning media is something that is used in learning to convey messages to students, and this something, when used simultaneously, can also stimulate students' interest to be interested in the contents of the message. (Rusydiyah 2020) The role of learning media is very important in the learning process, especially during a pandemic; for this reason, it is necessary to develop teaching media because learning media can clarify the presentation of messages and information so that it can make students more focused on education and learning media can improve and attract children's attention so that it can lead to learning motivation. Based on the very important role of the media in the learning process, the authors developed learning media, namely Augmented Reality Creative Mathematics printed media.

One of the developments in learning media that is currently still new is learning media using Augmented Reality. (Mustaqim and Kurniawan 2017; Tiyasari and Sulisworo 2021; Wulandari, A., Samijo, S., & Darsono 2022) The combination of Augmented Reality

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

technology with educational content creates new applications to increase the effectiveness and attractiveness of teaching and learning for students in everyday life. real. (Kesim and Ozarslan 2012; Saputri and Sibarani 2020) Augmented Reality technology can be used for teaching media, and many various applications use Augmented Reality technology, one of which is the Assemblr application. (Adrian, Ambarwari, and Lubis 2020; Tiyasari and Sulisworo 2021) A companion product to the Assemblr application, namely Augmented Reality Creative Mathematics print media, aims to make it easier to use the application, in which teachers and students only scan the images listed in the print media that the author will make then the image will turn into a 3D image object in the teacher's and student's devices. (Adrian et al. 2020; Sutresna, Yanti, and Safitri 2020) The Augmented Reality Creative Mathematics Media that the author created does not operate independently but must have an Assemblr application to support one another.

In learning mathematics, the media commonly used by teachers when carrying out the learning process for cubical and block material is limited to pictures on books and blackboards, where these images are two-dimensional images like other images in general. This can be a problem because the spatial material should be displayed realistically, like a three-dimensional image. So far, teachers only use visual aids such as iron frames in class, but students cannot bring these tools home for further study. The same problem is common in every school, namely in the teacher's room building materials only use limited media. One of them is at SDIT Istiqamah Balikpapan, which is the place for the author to conduct research. At that school, the authors worked pre-research, namely observing at SDIT Istiqamah Balikpapan and conducting interviews with the principal and teachers of class V. Based on the results of observations and discussions at the school, it turned out that they had not yet utilized Augmented Reality-based learning media as a medium for delivering geometric material to students during the study. Teachers at these schools still use standard and simple media when teaching. For class V the learning media used are PowerPoint, whiteboards and printed books. Learning media in mathematics lessons about geometrical materials usually only use a blackboard to draw geometric shapes or look in a printed book.

Method

This research uses development research. Development research is a research method used to produce certain products and test their effectiveness of these products. (Sugiyono 2016) During the process of developing and manufacturing products, development research has characteristics in the manufacturing process, namely seeking information (needs analysis). After the data is obtained, it is then processed. A research design is made, such as product design (media). It goes through the revision stage product to several experts. After that, the product trial stage involves several research subjects to be tested and measured the feasibility of the product that has been made.

The development model carried out by researchers is the ADDIE model. The stages contained in the ADDIE development model consist of five steps: Analysis, Design, Development, Implementation and Evaluation. (Pribadi 2017)..

Result and Discussion

The development of ADDIE Creative Mathematics learning media uses the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. Developing Augmented Reality Creative Mathematics media begins with a need's analysis. This needs analysis stage is carried out by observing activities at

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

SDIT Istiqamah Balikpapan. Analysis of needs by analyzing the learning process, analysis of facilities and infrastructure, and analysis of users (students and teachers). This is done to find existing problems, so it is necessary to develop a learning media. After the needs analysis, the second stage is the design (planning) stage. At this stage, the researcher makes media designs such as competency maps, media content outlines, and media scripts (storyboards).

After making the competency map, outline the contents of the media that are used as an initial description before making the media. The media content's outline includes selecting images resembling the shapes of cubes and blocks, and the researcher selects images that can be found in students' daily lives. To build a cube space, use an example of a three-dimensional image of a dice because a dice has characteristics such as a cube shape, which has 6 sides, 12 edges, 8 vertices, 12 diagonal planes, 4 diagonal planes and 6 diagonal planes. To build a block room, use the example of a three-dimensional image of a cupboard because cupboards are often found around students and have the characteristics of having 6 sides, 12 edges, 8 vertices, 12 diagonal planes, 4 diagonal planes and 6 diagonal planes. Examples of three-dimensional images that are real and can be found every day can build students' imagination and understanding of geometric materials.

Then the description of the material described in each image will appear in the learning media. The material report contains explanations relating to the geometrical parts and volumes of cubical and rectangular geometric shapes. On each display will appear pictures, descriptions and audio. The complete outline of the contents of this media can be found in the attachment. Furthermore, making the contents of the guidebook for the use of learning media. The contents of this guidebook for using education media include how to use the media, the steps to access the Assemblr Edu application, and the steps for using learning media by scanning images using a device to the images already available on the learning media.

The last plan is to make a media script (storyboard), namely making points for each scene (view) and the plot that will appear in the learning media. Making the first media script starts with creating a location in the Assemblr Studio application. This is included in software design, namely creating a scene using an application in the software. The scene contains material for building cubes and blocks. The first scene contains material for the parts that make up the cube. The initial appearance of this material is a picture of the dice and its explanation, a view of the two ribs of the cube, a view of the three sides of the cube, a view of the four corner points, a view of the fifth side diagonal, a view of the sixth space diagonal, and a view of the seventh the diagonals of the cube. Each view contains an image and description. And the audio will play automatically when the display is pressed. It is intended that students easily understand the learning material. Then in the second scene contains volume cube material; the initial appearance of this material is the image of the dice and its explanation; the second display of the transparent cube, the third display of unit cubes that fill the transparent cube, the fourth display of unit cubes that have served the contents of the transparent cube and the fifth display of the volume formula cube. Each view contains an image, description and audio, which will play automatically when the show is pressed.

In the third scene, it contains material for the parts that make up the beam; the initial appearance of this material is a picture of a cupboard and its explanation, a view of the two ribs of the shaft, a view of the three sides of the beam, a view of the four corner points, a view of the fifth side diagonal, a view of the sixth space diagonal, and a view of the seventh the diagonals of the beam. The fourth scene contains material for the volume of blocks; the initial appearance of this material is a picture of a cupboard and its explanation; the second display of transparent blocks. The third display of unit cubes that fill the fine beam, the fourth display of

TECHNIUM SOCIAL SCIENCES JOURNAL

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

unit cubes that have served the contents of the transparent beam and the fifth display of the beam volume formula. Each view contains an image, description and audio, which will play automatically when the show is pressed. Then the fifth to eighth scenes have mini quizzes or practice questions in the form of QR codes that can be scanned via student devices. These mini-quizzes discuss learning material in learning media.

After all the scenes have been created in the Assemblr Studio application, the researcher saves and publishes them for users (students and teachers). The form of Augmented Reality Creative Mathematics learning media is included in the hardware design because it can be printed. When the researcher conducted the trial at school, the researcher published Augmented Reality Creative Mathematics learning media to a special printing place using glossy type paper measuring 25 × 36 cm. Then entering the third stage, namely the development stage, this stage learning media products are ready to be developed through several processes, namely pre-production, production and post-production processes. The pre-production process is carried out by preparing devices that support the creation of Augmented Reality Creative Mathematics learning media. The device is divided into software (software) and hardware (hardware). For software, researchers use several applications, namely the Assemblr Studio application to design geometric shapes of cubes and blocks in three dimensions and the CorelDraw 2020 application to create the appearance of Augmented Reality Creative Mathematics media consisting of images of cubes and blocks to be scanned using a device through the Assemblr application. Edu. For hardware, researchers used laptops, mice, gadgets and printers.

When all the software and hardware are available and ready to use, the next process is the production process. In this process, the researcher begins to make learning media based on the design that was made before. This production process takes about 10 days in the manufacturing process because the application for making three-dimensional images used is a challenge. The production process begins by creating a three-dimensional design in the Assemblr Study application on a laptop. This application must create an account first to access its features in it. Then after creating an account, the researcher looks for the basic elements of making cubical and block shapes, such as lines and points already available in the application. After that, each line and dot is connected to form a dice (cube) and a cupboard (block) shape. The choice of colour is also important because students usually like bright colours to attract student's attention, so researchers choose blue, yellow, white, and red for three-dimensional images. The selection of fonts and colours must also be considered so students can read them.

After the three-dimensional image production process is complete, the researcher saves and publishes the image code from the application so that students can scan it on printed learning media. Next is to produce Augmented Reality Creative Mathematics learning media and media use guidebooks that will be published through the CorelDraw 2020 application. The printed learning media is 25 × 36 cm in size. This printed media contains images of cubes and blocks linked to the Assemblr application. So students can scan the image. Furthermore, producing a guidebook for learning media through the CorelDraw 2020 application. This guidebook consists of 25 pages starting with the cover, preface, table of contents, and a brief description of Augmented Reality Creative Mathematics learning media and how to use the media. This guidebook for learning media is HVS A6 paper size (10.5 × 14.8 cm).

The last process is post-production; after the product has gone through the production process, the entire Augmented Reality Creative Mathematics learning media product is then validated by experts to determine its feasibility and be used and tested on students. Researchers used two experts, namely media experts and material experts. The researcher gave a

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

questionnaire to media experts to assess how appropriate it was and to find out suggestions and comments from experts so that this learning media product was even better. The media expert's assessment results were 86% in the very feasible category. However, there were still several notes and suggestions. The user manual was clarified again, the scanned image was enlarged, and the choice of letters and testing of student device specifications were. After the media expert, the researcher validated the material to the material expert, namely a class VI (six) mathematics teacher at SDIT Istiqamah Balikpapan. The researcher gave a questionnaire to material experts to assess how appropriate it was and to find out suggestions and comments from experts so that the learning material contained in the learning media was even better. The results of the material expert's assessment were 96% in the very feasible category, but there are still several notes, namely, this learning media depends on an internet connection. The press is faster to use if the internet connection is more stable. Learning media has gone through a validation process by several experts and shows the feasibility results of the media expected by researchers, namely very feasible.

The fourth stage is the implementation stage; at this stage, the learning media validated by experts is ready to be tested on users, namely teachers and students. Learning media trials were carried out twice: small-scale and large-scale. Before carrying out the problem, the researcher informed the technical implementation of this media trial homeroom teacher of class V so that when carrying out the test, it could run smoothly. The performance of the media trial was guided by the homeroom teacher for class V and the researcher as a companion in the class, observing how this learning media product was used during the learning process. Then students are divided into several groups to ease student work because this Augmented Reality Creative Mathematics learning media requires a device and an internet connection. Widgets that can access the Assemblr Edu application have Android specifications above the Android version of Lollipop and IOS users above IOS 6. If a device has the specifications mentioned below, it is possible that the device is not compatible for use with the Assemblr Edu application.

Students were told to bring the device into class and try it out. The trials were carried out twice, namely small and large-scale problems. In small-scale trials, researchers were allowed by the school principal to carry out tests in class V-A with a total of 23 students, but during the coronavirus pandemic, not all students took part in class learning; only some of the rest took part in lessons through zoom meetings. Students who entered the small-scale trial involved 3 students. Of these 3 students, only 1 person had difficulty using this learning media because the student did not like the world of IT, so when the trial took place, this student did not try. The feasibility assessment results from small-scale trials were 83% in the very feasible category. After conducting a small-scale test on students, and then conducting a problem on the homeroom teacher of class V, the results of the feasibility assessment were 94% in a very feasible category. The homeroom teacher of class V likes learning media like this because it can increase student activity. These two feasibility results can be the basis for proceeding to large-scale trials.

The large-scale trial involved 20 students. This trial was conducted to determine the feasibility of learning media from students on a large scale. Large-scale trials were divided into several groups, one containing 3-4 students. Then the teacher teaches learning material using Augmented Reality Creative Mathematics learning media in the classroom. After carrying out the learning process, the researcher distributed questionnaires to 20 students in the class who had participated in the trial. This large-scale trial resulted in a feasibility assessment of 74% in the feasible category. This result is the result expected by the researcher.

TECHNIUM SOCIAL SCIENCES JOURNAL

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

The fifth stage is the evaluation stage; at this stage, every process of making learning media is evaluated and revised by experts so that researchers make improvements to improve learning media so that it is suitable for users. The revisions from media experts have been explained at the post-production development stage; namely, the user manual is clarified, the scanned image is enlarged, the choice of fonts and testing of student device specifications. All suggestions from media experts and researchers try to improve. As for recommendations from media experts, namely that the user guidebook is clarified, the researcher explains it even more because there are steps in the user manual that still need to be added. Then the scanned image was enlarged by the researcher by enlarging the image from the previous size and then choosing letters that originally used a lot of shadows; after being corrected by the researcher removing the shadows and choosing another letter shape so that it could be read clearly and finally testing the specifications of student devices, before carrying out In the trial, the researchers have informed the homeroom teacher of class V because each student has different gadget specifications. For this reason, the solution for these other device specifications is to form students into several groups so that students do not have specifications when conducting learning media trials. Adequate devices can use the instruments of a group of friends with acceptable device specifications and can access the Assemblr Edu application.

Every human product has advantages and disadvantages, including Augmented Reality Creative Mathematics learning media. The benefits of Augmented Reality Creative Mathematics education media are that this media is still new media, and only a few schools use Augmented Reality technology-based learning media, so this can be an additional reference for teachers and students. Then this Augmented Reality Creative Mathematics media can increase student activity and attract students' attention during the learning process. (Afthori, Kurniadi, and Atmadja 2019; Amelia, Wedi, and Husna 2022; Khairunnisa and Aziz 2021) This is known by researchers when conducting trials in class students are so enthusiastic about trying Augmented Reality Creative Mathematics media because students have never found press like this to study.

When students use learning media, some students can use it, and some are less able to use Augmented Reality Creative Mathematics media. Using Augmented Reality Creative Mathematics media. Only a few students are less able to use this media; the rest, almost all students, can use it well. Furthermore, this learning media can make it easier for teachers to teach, especially in geometric material, which is rather difficult for students to accept; with this media, students can easily understand cube and block geometric fabric. This research is in line with a study from Sari et al. (2012), who said that implementing AR technological innovations in learning will create a new, effective atmosphere and provide an overview of the learning system's real-world environment.

This learning media has drawbacks; namely, it still depends on an internet network connection, and when the internet network connection is less stable, the image display will appear slowly when the image is scanned. When it is checked using a device, the device shifts the image will disappear, so the device must always be held, and the camera must always be directed at the idea; if it does not match, the image will disappear or not appear. This learning media has limitations regarding the printed materials used, and the coverage of geometric material in Creative Mathematics Augmented Reality media. There are few, only two geometric shapes because printing at a larger size will require more expensive costs. Researchers feel that Augmented Reality Creative Mathematics media could be better. However, regarding the feasibility of Augmented Reality Creative Mathematics media, it is feasible and can still be used in the learning process. This media can be improved (revised) in the future, and added various

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

elements to make it more complete so that users can use Augmented Reality Creative Mathematics media completely.

Augmented Reality Creative Mathematics Media has a printed and bound manual by the researcher. The guidebook still has drawbacks because of its small size, namely A6 size, it should be more significant than that size, but due to budget and time constraints, the researchers were able to make such a size. Of the advantages and disadvantages that exist in the use of AR technology in the process of learning media using augmented reality can stimulate students' mindsets in thinking critically about a problem and events that exist in everyday life because AR can visualize abstract concepts for understanding and the structure of an object model. (Mustaqim and Kurniawan 2017) Based on research that has been conducted, the majority have positive feedback from students and teachers in using AR technology-based learning media.

The advantages and disadvantages of Augmented Reality Creative Mathematics learning media still make this media usable in the learning process because Augmented Reality Creative Mathematics learning media can be a source of knowledge information and support learning activities. This is in line with the learning objectives conveyed by Pribadi (2017) in his book, which states that the use of media, both for individual and group needs in general, has several objectives, namely to obtain information and knowledge, support learning activities and as a means of persuasion and motivation. Learning media generally contain information and specific knowledge and skills. Each media type has its peculiarities to be used in the learning process.

Augmented Reality Creative Mathematics learning media is devoted to learning mathematics, especially in the material of cubes and blocks in class V. With this media in the learning process, it can shape student activity and attract students' attention when learning. Researchers adapt the material in this learning media to students' daily lives. This is in line with learning mathematics; learning mathematics can prepare students so that the mindset of mathematics is formed in everyday life. In addition, learning mathematics can create a logical, critical, creative, careful and disciplined attitude in students.

The selection of learning media needs to be adjusted to the learning materials and objectives. Augmented Reality Creative Mathematics learning media according to the criteria in selecting media according to Mahnun (2012) states that media selection should pay attention to several principles, namely first, clarity of intent and purpose of establishing media; second, media familiarity, which involves knowledge of the nature and characteristics of media to be selected, and third, several media can be compared because several choices are more suitable for teaching purposes. For entertainment, general information, learning and so on. From this explanation, this learning media is used for learning purposes and is not familiar because this media is new media and involves technology that is rarely used by teachers and students when learning.

Augmented Reality Creative Mathematics learning media has its characteristics: using increased reality technology to turn images into three-dimensional images when scanned through a device. This is the definition of Meilaini (2018) in his book, stating that Augmented Reality is a technique that combines two-dimensional and three-dimensional virtual objects into a three-dimensional natural sphere and then projects these virtual objects in real-time. So that Augmented Reality Creative Mathematics learning media can be used for the learning process, especially on cube and block-building materials in class V.

TECHNIUM SOCIAL SCIENCES JOURNAL

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

Conclusion

Based on the results of the research and discussion that has been carried out, it is concluded that the process of developing Augmented Reality Creative Mathematics learning media goes through several stages, namely: a) analysis, namely needs analysis; b) design, namely design or planning, c) development, namely development, d) implementation, namely implementation and e) evaluation, namely evaluation. The results of the feasibility of Augmented Reality Creative Mathematics learning media can be seen from the experts and user responses. Media experts obtained an assessment of 86% very good category (very feasible and valid), then material experts evaluated 96% very good category (very feasible and valid). The results of the small-scale trial on students obtained an assessment of 83% in the very feasible type. The results of a large-scale test on students received an evaluation of 74% in the appropriate category, and the teacher's response assessment obtained 94% in the very feasible category.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

[1] Adrian, Qadhli Jafar, Agus Ambarwari, and Muharman Lubis. 2020. "Perancangan Buku Elektronik Pada Pelajaran Matematika Bangun Ruang Sekolah Dasar Berbasis Augmented Reality." *Simetris: Jurnal Teknik Mesin, Elektro Dan Ilmu Komputer* 11(1):171–76.

[2] Afthori, Dyka Afan, Dede Kurniadi, and Aldy Rialdy Atmadja. 2019. "Perancangan Media Interaktif Rumus Bangun Ruang Menggunakan Teknologi Augmented Reality Berbasis Android." *INTEGRATED (Information Tecknology and Vocational Education)* 1(2):9–13.

[3] Amelia, Sila, Agus Wedi, and Arafah Husna. 2022. "Pengembangan Modul Berbantuan Teknologi Augmented Reality Dengan Puzzle Pada Materi Bangun Ruang." *JKTP: Jurnal Kajian Teknologi Pendidikan* 5(1):62–71.

[4] Kesim, Mehmet, and Yasin Ozarslan. 2012. "Augmented Reality in Education: Current Technologies and the Potential for Education." *Procedia - Social and Behavioral Sciences* 47(222):297–302.

[5] Khairunnisa, Shafa, and Tian Abdul Aziz. 2021. "Studi Literatur: Digitalisasi Dunia Pendidikan Dengan Menggunakan Teknologi Augmented Reality Pada Pembelajaran Matematika." *Jurnal Riset Pendidikan Matematika Jakarta* 3(2):53–62.

[6] Mahnun, Nunu. 2012. "Media Pembelajaran (Kajian Terhadap Langkah-Langkah Pemilihan Media Dan Implementasinya Dalam Pembelajaran)." *An-Nida'* 37(1):27–35.

[7] Meilani, Gina Rahayu. 2018. *Membangun Aplikasi Augmented Reality Dengan Unity*. Surabaya: CV. Garuda Mas Sejahtera.

[8] Mustaqim, Ilmawan, and Nanang Kurniawan. 2017. "PENGEMBANGAN MEDIA PEMBELAJARAN BERBASIS AUGMENTED REALITY." *Jurnal Edukasi Elektro* 1(1).

[9] Pribadi, Benny A. 2017. *Media Dan Teknologi Pembelajaran*. Jakarta: Kencana.

[10] Rusydiyah, Evy Fatimatur. 2020. *Media Pembelajaran Problem Based Learning*. Surabaya: UIN Sunan Ampel Press.

[11] Saputri, Shelia, and Alexander J. P. Sibarani. 2020. "Implementasi Augmented Reality

Technium Social Sciences Journal
Vol. 40, 139-147, February, 2023
ISSN: 2668-7798
www.techniumscience.com

Pada Pembelajaran Matematika Mengenal Bangun Ruang Dengan Metode Marked Based Tracking Berbasis Android." *Komputika : Jurnal Sistem Komputer* 9(1):15–24.

[12] Sari, Wellia Shinta, Ika Novita Dewi, and Abas Setiawan. 2012. "Multimedia Presentasi Pembelajaran Berbasis Augmented Reality Untuk Pengenalan Pancaindra Dalam Mendukung Mata Pelajaran IPA Tingkat Sekolah Dasar." *Seminar Nasional Teknologi Informasi & Komunikasi Terapan* 2012(Semantik):24–29.

[13] Sugiyono. 2016. *METODE PENELITIAN Kuantitatif, Kualitatif Dan R&D*. Bandung: ALVABETA CV.

[14] Sutresna, Jaka, Fitri Yanti, and Andin Eka Safitri. 2020. "Media Pembelajaran Matematika Pada Usia Dini Menggunakan Augmented Reality." *Jurnal Sistem Dan Teknologi Informasi (Justin)* 8(4):424.

[15] Liyasari, Sindi, and Dwi Sulisworo. 2021. "Pengembangan Kartu Bermain AR Berbasis Teknologi Augmented Reality Sebagai Multimedia Pembelajaran Matematika." *Vygotsky* 3(2):123.

[16] Wulandari, A., Samijo, S., & Darsono, D. 2022. "Pengembangan Media Pembelajaran Matematika Berbasis Augmented Reality." *UNEJ E-Proceeding* 5(2):461–66.

Feasibility of Developing Creative Mathematics Learning Media Augmented Reality Building Materials

ORIGINALITY REPORT

5%	0%	3%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

3%

★ Astri Widi Astuti, Muhammad Yudhi Rezaldi, Slamet Riyanto, Rino Richardo. "A Review: Augmented Reality Technology-Based Interactive Learning Media", 2022 5th International Conference on Networking, Information Systems and Security: Envisage Intelligent Systems in 5g//6G-based Interconnected Digital Worlds (NISS), 2022

Publication

Exclude quotes	Off	Exclude matches	< 3%
Exclude bibliography	Off		