Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 20s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

The Effect Of Augmented Reality Interactive Learning Media For Vocational Students On Incresing Knowledge And Skills

Mardiana Ahmad[1], Popi Wabula[1], Syafruddin Syarif[2], Hasta Handayani Idrus[3,4]

[1]Programme of Midwifery Study, Hasanuddin University Graduate School, Indonesia

[2]Department of Electrical Engineering, Faculty of Engineering, Hasanuddin University, Makassar, Indonesia

[3]Department of Biomedical Sciences, Postgraduate School, Hasanuddin University (UNHAS), Makassar, Indonesia

[4]Center for Biomedical Research, Research Organization for Health, National Research and Innovation Agency (BRIN), Jakarta, Indonesia

***Corresponding Author:**

Mardiana Ahmad,

Email ID: mardianaahmad@pasca.unhas.ac.id

Cite this paper as: Mardiana Ahmad, Popi Wabula, Syafruddin, Hasta Handayani Idrus, (2025) The Effect Of Augmented Reality Interactive Learning Media For Vocational Students On Incresing Knowledge And Skills. *Journal of Neonatal Surgery*, 14 (20s), 154-165.

ABSTRACT

Objectives: Improving vocational students' knowledge and skills in learning using Augmented Reality (AR) interactive learning media.

Method: This research method is a literature review approach based on national and international scientific journals related to the use of Augmented Reality interactive technology to increase the knowledge and skills of vocational students. The literature reviewed and selected from several databases, namely PubMed, Scilit, ScienceDirect, Google Scholar and Semantic Sholar databases published from 2019 to 2024. This literature review was compiled by searching for scientific articles with the keywords 'increasing knowledge and skills, vocational students, Augmented Reality interactive learning media'. After filtering publications between 2019-2024, 115 articles were found, 30 articles were selected based on abstract, full text, open access, and eligibility. Finally, the authors read and selected the articles and obtained 30 relevant articles based on the specified criteria.

Results: Augmented Reality (AR) Interactive learning media increases the knowledge and skills of vocational students, besides that AR also increases the effectiveness and quality of learning, students are more active in participating in learning so as to make learning more interesting and interactive. **Conclusion:** The use of Augmented Reality technology as an interactive learning medium is proven to be effective in improving vocational students' knowledge and skills. This literature review shows that AR not only improves conceptual understanding but also practical skills through a more immersive and interactive learning experience.

Keywords: *Knowledge, Skills Vocational Students, Learning Media, Augmented Reality*

1. INTRODUCTION

Technology and science go hand in hand to bring progress that encourages humans to be able to compete and adapt in a global era that is getting tighter every day. Now almost everyone utilizes technology in their daily lives. This technological era affects various fields of life, including the field of education1 . The rapid development of science and technology today has an impact on all aspects of life, information is becoming increasingly accessible[1]. Various information from all over the world without knowing the limits of distance, time and space. This results in humans in the digital era, very dependent and must always be connected to technology [2].

Health is an important need for everyone in achieving the high quality of human resources. Efforts to improve the quality of human resources are carried out from the aspect of education which has encountered various cases, such as the high dropout rate in Indonesia, the quality of education is problematic, and the lack of equitable education in Indonesia In response to these cases, all parties must be in line in paying attention to the development of this education. There are various efforts that can be done to improve it all, such as by optimizing the quality of quality in schools by improving the quality of the process in the learning environment.[1] Over time Augmented Reality can be developed in various fields including education [2].

The Media is an important part of the learning process to achieve learning needs and objectives. Media can be delivered online or offline. Online media is an example of media innovation that is often used for higher education[3]. With the development of digital technology, the use of learning media is increasingly showing its variety and advantages. Many learning media that have been integrated with technology, one of which is Augmented Reality (AR)[4] . Instructional media can make abstract material more real and media can be used as a link between material and natural findings by including content/images that are appropriate to the material[5].

The learning process is influenced by the learning process which consists of four important components, namely teaching materials, learning atmosphere, media and learning resources, and teachers / lecturers as learning subjects.[6] In line with the widespread use of gadgets/smartphones among teachers/lecturers and students, learning technology is also developing towards Android mobile-based media which forces teachers to compete to develop various Android-based learning applications with multimedia-based content that can be used by students to learn in class and outside the classroom[7].

The AR technology can insert certain information into the virtual world and display it in the real world with the help of equipment such as webcams, computers, android phones, and special glasses.[8] The Augmented Reality (AR) learning media is a media that combines images, video, audio, and text into a real environment. [9] The Augmented Reality (AR) technology is a learning media resulting from the merging of real objects and virtual objects. AR combines 2D and or 3D virtual objects into a real environment, then the virtual objects are projected into real time. Information displayed through virtual objects cannot be received by users using the five senses.[10] Augmented reality (AR) technology is applied not only to what is seen with the sense of sight (visual), but also can be added to others such as sound (audio), touch and smell[11].

The Association of Indonesian Internet Service Providers (APJII) announced that the number of Indonesian internet users in 2024 will reach 221,563,479 out of a total population of 278,696,200 Indonesians in 2023. From the results of the 2024 Indonesian internet penetration survey released by APJII, the Indonesian internet penetration rate touched 79.5%. The data shows that most Indonesians have smartphones and use internet services, therefore, this can be used as a potential for development in various fields, especially in terms of education. To increase learners' motivation, advances in digital technology, especially on mobile devices such as smartphones, can be used as learning media. Mobile learning seems to be fun and not limited by space, time, place, and cost[12].

Knowledge of the technology and the lack of skills in implementing and even using it make it difficult to realize the implementation of AR in the development of learning media15 Learning media using Augmented Reality is expected to be used as one of the learning resources for students. Media using android-based Augmented Reality can also serve as an independent learning media for students who can help students in learning outside of school hours such as independent learning at home[13].

Inclusion criteria

1. The article discusses learning methods for improving knowledge and skills based on Auqmentid Reality.
2. Publication year 2018-2024
3. International and National Publications
4. National Journal has ISSN
5. Articles use English and Indonesian
6. Orginal articles, abstracts, full text and open-access

Exclusion criteria

1. Articles other than English.

2. METHODS

a. Research Design

This review aimed to assess the effectiveness of conventional and video-based techniques in improving mothers' knowledge on stunting prevention. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standard.

b. Eligibility criteria

The PICOS framework is used to define inclusion and exclusion criteria.

1. Population (P) : Mothers who are pregnant or have children under the age of five.
2. Intervention (I) : Educational intervention, either conventional or
3. Comparison (C) : Conventional techniques versus. Video-based educational approach

Outcome (O) : Improved maternal understanding of stunting

4. Research design (S) : Quantitative research (RCT, quasi-experimental, cohort)

c. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1. The article discusses learning methods for improving knowledge and skills based on Auqmentid Reality.	Editorials, reviews, and opinion articles
2. Publication year 2019-2024	Publications outside 2019-2025
3. International and National Publications	Not through a peer-review process
4. National Journal has ISSN	Research without a focus on AR
5. Articles use English and Indonesian	Research not written in English
6. Orginal articles, abstracts, full text and open-access	Type of research literature review

d. Search Strategy

1. Electronic searches were conducted using four databases: Google Scholar, PubMed, and Science-Direct.

2. The search was conducted between January 2019 and March 2025 using the following keyword combinations: 'knowledge' AND "skills" AND ('Augmented reality, vocational"). Boolean operators and Medical Subject Headings (MeSH) were used where appropriate

e. Study Selection Process

All articles identified were reviewed jointly between the researcher and supervisor based on the title and abstract. Full text screening was conducted for studies that met the inclusion criteria. Any discrepancies were resolved through discussion or consultation. The study selection process is illustrated using the PRISMA flow chart. It can be seen in figure 1

f. Data Extraction

Standardized data extraction forms were used to collect key information from each included study: title, authors, year of publication, country, study design, sample, type of intervention, tools to measure knowledge, and main outcomes. This can be seen in table 1.

g. Quality judgement

Methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tool, based on study type. Each study was classified as high, medium, or low quality based on the assessment criteria. Results can be seen in table 2.

h. Data Synthesis

As there was heterogeneity in study design and outcome measures, a narrative synthesis approach was used. Studies were grouped and analyzed based on the type of educational intervention (conventional vs. video-based) and the level of improvement in mothers' knowledge of stunting.

3. RESULTS

The information extracted was categorised based on the results of the literature review in this synthesis. Abstracts of research journals were entered into the table as per the form mentioned above. The abstract and full text of the article will be read and assessed to clarify the discussion. Furthermore, the evaluation summary will be evaluated based on the content of the research objectives as well as the research results and findings. The purpose of this research is to recognise the benefits of using AR technology in the learning process. The results of article searches on databases such as Google Scholar, PubMed, and ScienceDirect can be seen in Figure 1 below;

The strategy for article search can be seen in Figure 1.

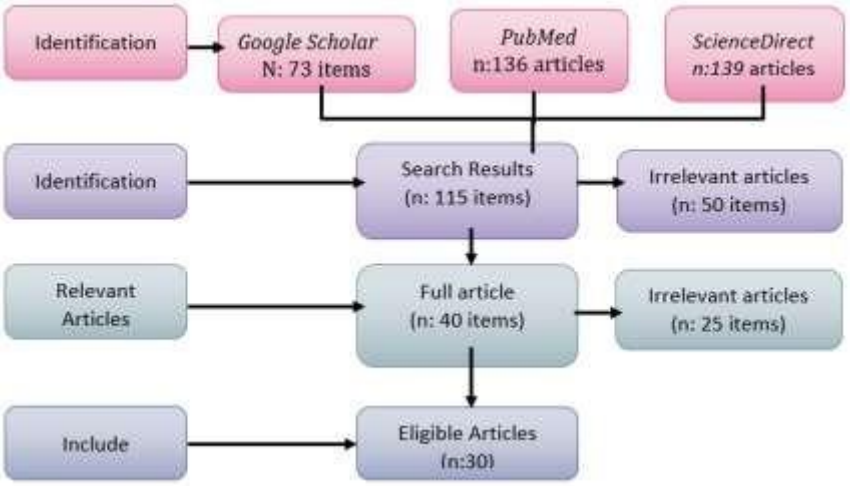

Table 1. Research Data Extraction

Yes	Author/Years	Title	Journal	Results
1	T. Soctrates, F. Mifit[14] et al 2022	Effectiveness of the Application of Augmented Reality-Based Physics Learning Media	Journal of EduPhysics	Utilization of media using AR can stimulate the mindset in critical thinking towards problems and events that exist in everyday life.
2	A. Nurwicaksono, G. Swalag.[1] et al 2023	Android-based human anatomy Augmented Reality application analysis and design	Journal of Information System and Application Development	Results of the development in the form of an Android-based human anatomy AR application on the lab learning system.learning system. This application contains learning about the anatomical structure of the human body, as well as the names and locations of organs in the human body. The questions and games available are adjusted to the standards of elementary and junior high school levels.
3	N. Resti, R. Ridwan, R. Palupy[4] et al 2024	Innovation of Learning Media Using AR (Augmented Reality) on Digestive System Material	Biodic Journal	Enhancing AR media through the incorporation of audio and video, educators canmcreate more immersive and contextualised learning scenarios. For example, in a natural science lesson, students can watch a simulation of a scientific process, such as particle motion at the atomic level or the process of photosynthesis, enriched by audio commentary explaining the step-by-step process.

4	M. Wiriyanti, S. Syarif, M. Ahmad[3] et al 2020	The influence of WEB-based learning media on the improvement of practical skills in the care of the second phase of labour for DIII midwifery students	Journal of Muhammadiyah Nursing	The statistical test results showed that there was a difference in the results of measurement I and measurement II of labour care skills in the control group ($p<0.05$) and contributed 46.3%. In the application group, there was a difference in skills before and after the web-based application ($p<0.05$) and the application contributed 91.7% in improving the skills of childbirth care in the second stage of labour.
5	R. Melindawati, Z. Zainuri I. Hidayah[5] et al 2023	Application of Augmented Reality (AR) Media in Maths Learning	e-DuMath JOURNAL	AR can be defined as a technology in the field of multimedia that can combine one or more 3D objects into a real environment using camera media. The advantage of AR is that it can display interesting visualisation as if the 3D object is in the real environment.
6	Y. Nauko, L. Amali[8] et al 2021	An Introduction to Body Anatomy Using Android-Based Augmented Reality Technology Abstract	JAMBURA JOURNAL OF INFORMATICS	The learning media AR can visualise abstract concepts for understanding and the structure of an object model allows AR as a more effective media in accordance with the objectives of the learning media.
7	V. Sapulette[9] et al 2023	The Use of Augmented Reality (AR) Learning Media in Improving Student Learning Outcomes	Journal on Teacher Education	The study activities with the AR-based problem solving learning model on heat transfer material were able to significantly improve students' concept understanding in the experimental class. Judging from the results of the Pretest and Posttest, in the experimental class with the average value of each Pretest 42.97 and Posttest 83.91. So that the use of AR-based learning media is very influential in increasing students' understanding of concepts.
8	H. Saputra, S. Salim, N. Idhayani[6] et al 2020	The Development of Augmented Reality-Based Learning Media	Education Journal	Augmented Reality-based learning media was also tested in a small group of 8 students. small group, namely 8 students. The results of student assessment obtained an average of 80.89%. The percentage when referring to the learning

				media eligibility criteria table is categorised as valid and can be used after minor revisions.
9	U. Usmaedi, P. Fatmawati, A. Karisman[7] et al 2020	Augmented Reality Application Technology-Based Learning Media Development in Improving the Teaching Process of Elementary School Students	Journal of Educatio FKIP UNMA	In order to facilitate the flow of the programme, researchers make a design in the form of flowcart Augmented Reality-based learning media applications. Then the author makes a navigation structure which contains the flow of information that will be displayed on the Augmented Reality-based learning media application.
10	M. Ahmad, S. Syarif, I. Idris[10] et al 2021	An augmented reality (AR) based learning media improves the physical examination skills of the integumentary system of pregnant women midwifery students.	Journal of Gac Sanit	The results of the analysis showed that the intervention group had a statistically significant difference in skills P < 0.001 (P < 0.05) between the intervention group and the control group. each measurement. The initial measurement (pretest) showed that 100% of respondents had no skills. After AR and demonstration, there was a rapid increase in skills, 72.6% of respondents were skilled.
11	A. Taufik, L. Ashari[11] 2023	Augmented Reality Application Training for Students of Institut Pendidikan Nusantara Global as Online Learning Media	Journal of Community Education and Technology	The results that have been achieved in the implementation of community service activities in the form of training in making AR applications with Metaverse Studio.making AR applications with Metaverse Studio, provides results such as increasing knowledge and understanding in the use of AR technology to support various activities in schools, increasing the ability of teachers in making material as one of the more interesting ways of delivery accompanied by various animations, audio and video that students usually really like.
12	A. Dyah, A. Mandiri, S. Aryuti,[15] et al 2023	Utilization of Augmented Reality Technology as a Health Education Media for Pregnant Women: Alpha Testing Utilization of Augmented Reality as a Health Education Media For Pregnant Women: Alpha Testing Pregnancy is a physiological process AuRil	Journal of JKKR	Use of the AuRil app. If the betta test results are considered favourable, the AuRil application is ready to be used on a wider scale.

		(Augmented Reality Pregnant Women)		
13	D. Surani, A. Fricticarani[16] et al 2023	The Effect of Using Assemble Edu Augmented Reality Media in Increasing Junior High School Students' Interest in Learning	Journal of JPPP	The results of the T-Test test show that the Augmented Reality Assemblr Edu media variable has an influence on student learning interest in science subjects in class VIII SMP Negeri 12 Cilegon.
14	M. Febriza, Q. Adrian, A. Sucipto[17] et al 2021	Application of Ar in Bacterial Classification Learning Media	Journal of BIOEDUIN	Based on the results of these calculations, the actual percentage value is 88% when compared to the Likert scale interpretation criteria range, then this application falls into a very good category, meaning that this application is very good in the Operability aspect or the Bacterial Classification AR application can be understood,learnt, used and interesting for application users.
15	A. Ipin, S. Yeni[18] et al 2019	The Development of Biology Learning Media Using Android-Based Augmented Reality (AR) Technology on the Concept of the Nervous System	Sainsmat journal	The development research used four stages: preliminary research; prototype internship; summative evaluation stage; and systematic reflection and documentation stage. For stages (3) and (4) are conducted when the product enters the field implementation phase.
16	V. Wibowo, K. Eka Putri, B. Amirul Mukmin[19] et al 2022	Development of Augmented Reality Based Learning Media on Animal Classification Material for Grade V Elementary School	PTK Journal	The study explained that the use of augmented reality media in learning activities helped students achieve the predetermined KKM of 71. This can be seen from the average learning outcomes of students who have used the media which is 75.6 which shows that the average student learning outcomes have reached the predetermined KKM..
17	S. Sungkono, V. Apiati, S. Santik[20]A et al 2022	Learning Media Based on Augmented Reality Technology	Journal of Education in Mathematics	Rated by 15 students, it was found that the percentage of the assessment score was 89% with the criteria 'Very Feasible'.
18	Y. Carolina,[21] et al 2022	Augmented Reality as a 3D Interactive Learning Media to Increase Learning Motivation of Digital Native Students	Journal of Teacher's Scientific Work	Best practice in the context of efforts to increase student motivation is carried out by using AR as a 3D interactive learning media carried out during the face-to-face learning

				process in geography subjects with the material of the earth as a planet
19	M. Hariyani, R. Wahyuningtas, Z. Sakinah,[22] et al 2024	Application of Augmented Reality Learning Media in Mathematics Learning to Improve Students' Problem Solving Ability.	PRISMA, Proceedings of the National Seminar on Mathematics	There is a connection between the PjBL learning model assisted by Augmented Reality (AR) media with the improvement of students' problem solving skills. PjBL and AR bring students to learning to solve daily life problems.
20	W. Rahayu, S. Bibi, M. Arief[23], et al 2022	Learning basic electrical circuits using Augmented Reality technology through virtual laboratory	Journal of Informatics and Science Education	The application of AR learning media can be used as a learning media for electrical measurement on electronic component material that can make it easier for students to understand lecture material. material on electronic components that can make it easier for students to understand lecture material.
21	K. Nistrina[24] et al 2021	Application of Augmented Reality in Learning Media	Information System, J-SIKA	Augmented Reality application into the world of Education will be a solution for educators to help them provide knowledge to students in addition to video conferencing. In particular, AR allows combining and superimposing real objects and virtual objects with the information to be conveyed.
22	J. Dessye, R. Rachman, V. Wiliyanti [25]et al 2024	THE IMPLEMENTATION OF AUGMENTED REALITY TECHNOLOGY IN LEARNING: IMPACT ON LEARNING OUTCOMES	Review of Education and Teaching	Based on the results of the literature study, it was found that the implementation of Augmented Reality (AR) technology in learning has a significant positive impact on student learning outcomes, both from cognitive, affective, and psychomotor aspects.
23	I. Al Ikhsan, N. Supriadi, W. Gunawan[26] et al 2022	Augmented Reality Based Learning Media: Flat-Sided Spatial Buildings Material	Journal of JKPM	The results of the analysis and discussion that has been done by researchers, can be drawn conclusions media Augmented Reality-based learning applications with categories worthy of use and get very interesting criteria as a medium of learning mathematics that can be used by students.

24	Sally, Sally O'Neill[27] et al 2022	The potency of 3D printing as an educational medium in nursing education	Journal of Scientific Horizons	The technology of 3D printing can be one of the solutions in an effort to provide educational media that provides convenience and effectiveness in the transfer of knowledge through simulation both to students in the academic and professional spheres.
25	N. Prasetya Linda, Lina Puspitasari[28] et al 2023	Augmented Reality Technology for Facial Massage Therapy for Pregnant Women with Preeclampsia	Infotech Machine	Tests on 10 scenarios display the same expected test results as the test results at the time of observation, so the application can be said to be 'Suitable / the same'. While from usability testing shows the results that the level of user experience of the application is 69.5, which based on the System Usability Testing (SUS) score criteria is 'Good (good)'. This shows that the application built can be accepted by users.
26	F. Sahida, Y. Nurfaizal,[29] et al 2020	Utilization of Augmented Reality as Protozoan Learning Media	JINITA	Augmented Reality (AR) technology can improve students' learning activity by presenting additional information visually in a physical environment, which can make abstract concepts more concrete and easy to understand
27	W. Hidayat, T. Sutikno, C. Dwi[30] et al 2019	Improving the Skills of Making Augmented Reality-Based Learning Media for Vocational High School Teachers	Journal of Graha Pengabdian	The manufacture of AR learning media carried out at Probolinggo 2 Vocational High School. obtained a significant increase in participant knowledge with a gain score value of 0.564 and entered the high category.
28	A. Irawan, R. Permana[2] et al 2019	Design and manufacture of Augmented Reality Technology as a medium for learning Minang script in Sdn 01 Patamuan based on Android	Journal of UPI YPTK	Augmented Reality application of minang script can make it easier for students and teachers to learn every word of minang script. Augmented reality application of Minang script can make it easier for students and teachers to learn every word of Minang script.
29	C. Suryaningtyas, Sutama[31] et al 2018	Development of Android-based Augmented Reality Applications as Science Learning Media on the Subject of Properties and Changes in the Form of Objects for Elementary Schools	Ngewandte Chemie International Edition	According to the results of the independent sample t-test, it shows an increase in students' knowledge when using augmented reality media on the properties and changes in the

				form of this object. This can be seen from the difference in the average pre-test and post-test scores, which are 61.74 for the pre-test and 88.7 for the post-test.
30	S. Fitriani, A.Muhsina, K. Dedi[13] et al 2018	The Development of Science Learning Media Using Android-Based Augmented Reality (Ar) for Students of Class Iii Sdn 015 Tarakan	Stuttgart	Learning media science using Augmented Reality (AR) based on Android is very feasible to be used as one of the learning media in schools.

4. DISCUSSION

Digital technology currently plays a vital role in the development of education, the utilisation of the latest digital technology as a learning medium is a top priority for education in the future. Digital technologies that are being intensely developed in the scope of international education are 3D technologies such as augmented reality, virtual reality, 3D printing and 3D images[27] With the use of augmented reality as one of the learning media, it is hoped that in a subject can be more interesting for students so that students will not feel bored21.

Learning media is one of the most important supports in the learning process, even the success or failure of the learning process is largely determined by the learning media used [20]. The utilization of technology in the era of society 5.0 in the world of education must be ready to face challenges due to the sophistication of technology that is very advanced. So by looking at these conditions, educators in Indonesia must be able to prepare learning methods that have an appeal to students[16] the application of AR technology is able to provide a new experience that is more interesting and more users because the interactive objects for those displayed are 3D objects and no longer just 2D objects[17]. Technology is an indispensable support for learning, highlighting 21st century education. Some of the benefits of technology in learning as stated by Mariyati that technology has a big role in improving the quality of learning and motivation of students to learn and help in constructing student knowledge effectively and efficiently[21]. Using AR is suitable as one of the media to help the learning and teaching process, because it can improve students' understanding of the structure of an object[22].

Augmented Reality (AR) is a technology that can combine virtual objects that have 2 dimensions or 3 dimensions then insert them into the real environment and combine them so as to create a combined space that is mixed (Mixed Reality) and displayed in real time (real time) so that Augmented Reality is an interaction technology that combines real world objects (real world) and virtual world objects (virtual world).[23]. The application of Augmented reality in the field of Education has the advantage of being an educational medium that has a considerable influence where students who study wave material will understand more easily than those who do not use augmented reality[24]. As the application of technology in learning increases, various studies have shown the benefits of AR technology in improving motivation and learning outcomes. AR allows students to explore materials independently and practically, reducing dependence on conventional learning methods[25].

Student learning activeness is an activity in which students participate directly during the learning process. Student learning activeness is an activity in which students participate directly during the learning process [32]. Student learning activeness is an activity in which students participate directly during the learning process[29]. Based on the learning components described earlier, teaching media is one of the components that has a considerable influence on the learning process, this is because student interaction with the media is manifested in the act of learning, seeing the state of student learning when interacting with the media used[33]. The advantages of AR media as educational media include, 1) Increase learning motivation and attention, 2) Helps teachers explain material more easily, 3) Makes knowledge retention better, 4) Can be used as media in blended learning, 5) Provides a real learning experience, and 6) Increases student learning competencies[34]. AR technology can be used in various fields. In educational activities such as teaching and learning animation, AR technology can create a learning experience that is focused on effective experimentation, as it allows integrating the real world into 3D form, so as to increase students' curiosity[28].

5. CONCLUSIONS

Augmented Reality emerges as an innovative solution in education because it is able to combine the real world and the virtual world in two or three dimensions in real-time. AR as a learning media has the advantage of increasing student motivation, understanding, and involvement in the learning process. reducing dependence on conventional methods, as well as creating a more interesting and enjoyable learning experience.

REFERENCES

[1] Nurwicaksono AS, Swalaganata G. Analisis dan perancangan aplikasi Augmented Reality anatomi tubuh manusia berbasis Android. *Journal of Information System and Application Development*. 2023;1(1):47-57. doi:10.26905/jisad.v1i1.9866

[2] Irawan A, Permana R, Putra MR. Perancangan Dan Pembuatan Teknologi Augmented Reality Sebagai Media Pembelajaran Aksara Minang Di Sdn 01 Patamuan Berbasis Android. *Majalah Ilmiah UPI YPTK*. 2019;26(2):12-21.

[3] 3. Wiriyanti M, Syarif S, Ahmad M, Prihartini SD, ... Pengaruh Media Pembelajaran berbasis WEB Terhadap Peningkatan Keterampilan Praktikum Asuhan Kala II Persalinan Mahasiswa DIII Kebidanan. *Jurnal Keperawatan Muhammadiyah*. 2020;5(2):77-81.

[4] Resti N, Ridwan R, Palupy RT, Riandi R. Inovasi Media Pembelajaran Menggunakan AR (Augmented Reality) pada Materi Sistem Pencernaan. *Biodik*. 2024;10(2):238-248. doi:10.22437/biodik.v10i2.34022

[5] Meilindawati R, Zainuri Z, Hidayah I. Penerapan Media Pembelajaran Augmented Reality (Ar) Dalam Pembelajaran Matematika. *JURNAL e-DuMath*. 2023;9(1):55-62. doi:10.52657/je.v9i1.1941

[6] Saputra HN, Salim S, Idhayani N, Prasetiyo TK. Augmented Reality-Based Learning Media Development. *AL-ISHLAH: Jurnal Pendidikan*. 2020;12(2):176-184. doi:10.35445/alishlah.v12i2.258

[7] Usmaedi U, Fatmawati PY, Karisman A. Pengembangan Media Pembelajaran Berbasis Teknologi Aplikasi Augmented Reality Dalam Meningkatkan Proses Pengajaran Siswa Sekolah Dasar. *Jurnal Educatio FKIP UNMA*. 2020;6(2):489-499. doi:10.31949/educatio.v6i2.595

[8] Nauko YS, Amali LN. Pengenalan Anatomi Tubuh Menggunakan Teknologi Augmented Reality Berbasis Android Abstrak. 2021;3(2):66-76. doi:10.37905/jji.v3i2.11720

[9] Sapulette V. Penggunaan Media Pembelajaran Augmented Reality (AR) dalam Meningkatkan Hasil Belajar Siswa. *Journal on Teacher Education*. 2023;5:208-213.

[10] Ahmada M, Syarif S, Idris I. Machine Translated by Google Media pembelajaran berbasis augmented reality (AR) meningkatkan keterampilan pemeriksaan fisik sistem integumen ibu hamil mahasiswi kebidanan Machine Translated by Google. 2021;35:221-223.

[11] Taufik A, Ashari LH. Pelatihan Aplikasi Augmented Reality Bagi Mahasiswa Institut Pendidikan Nusantara Global Sebagai Media Pembelajaran Daring. *Dedikasi: Jurnal Pengabdian Pendidikan dan Teknologi Masyarakat*. 2023;1(2):69-74. doi:10.31004/dedikasi.v1i2.18

[12] APJII. Penetrasi & Profil Perilaku Pengguna Internet Indonesia Tahun 2024. online.

[13] Fitriani Eka S, Muhsinah A, Dedi K. Pengembangan Media Pembelajaran IPA menggunakan Augmented Reality (AR) Berbasis Android pada Siswa Kelas III SDN 015 Tarakan. *Widyagogik*. 2018;6(1):57-72.

[14] Socrates TP, Mufit F. Efektivitas Penerapan Media Pembelajaran Fisika Berbasis Augmented Reality: Studi Literatur. *EduFisika: Jurnal Pendidikan Fisika*. 2022;7(1):96-101. doi:10.59052/edufisika.v7i1.19219

[15] Dyah A, Mandiri A, Aryuti S, Martini N. Pemanfaatan Teknologi Augmented Reality sebagai Media Edukasi Kehamilan : Uji Alpha Utilization of Augmented Reality as a Health Education Media For Pregnant Women : Alpha Testing Kehamilan merupakan proses fisiologis AuRil (Augmented Reality Ibu Hamil). 2023;2(2):27 - 33.

[16] Surani D, Fricticarani A. Pengaruh Penggunaan Media Augmented Reality Assemblr Edu dalam Meningkatkan Minat Belajar Siswa SMP. *Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP*. 2023;4(3):209-216. doi:10.30596/jppp.v4i3.16429

[17] Febriza MochA, Adrian QJ, Sucipto A. Penerapan Ar Dalam Media Pembelajaran Klasifikasi Bakteri. *Jurnal BIOEDUIN : Program Studi Pendidikan Biologi*. 2021;11(1):10-18. doi:10.15575/bioeduin.v11i1.12076

[18] Pengembangan Media Pembelajaran Biologi Menggunakan Teknologi Augmented Reality (AR) Berbasis Android pada Konsep Sistem Saraf. *Sainsmat : Jurnal Ilmiah Ilmu Pengetahuan Alam*. 2019;8(2):47. doi:10.35580/sainsmat82107192019

[19] Wibowo VR, Eka Putri K, Amirul Mukmin B. Pengembangan Media Pembelajaran Berbasis Augmented Reality pada Materi Penggolongan Hewan Kelas V Sekolah Dasar. *PTK: Jurnal Tindakan Kelas*. 2022;3(1):58-69. doi:10.53624/ptk.v3i1.119

[20] Sungkono S, Apiati V, Santika S. Media Pembelajaran Berbasis Teknologi Augmented Reality. *Mosharafa: Jurnal Pendidikan Matematika*. 2022;11(3):459-470. doi:10.31980/mosharafa.v11i3.737

[21] Carolina Y Dela. Augmented Reality sebagai Media Pembelajaran Interaktif 3D untuk Meningkatkan Motivasi

Belajar Siswa Digital Native. *Ideguru: Jurnal Karya Ilmiah Guru*. 2022;8(1):10-16. doi:10.51169/ideguru.v8i1.448

[22] Haryani M, Wahyuningtyas R, Sakinah ZN, Susilo BE. Studi Literatur: Penerapan Media Pembelajaran Augmented Reality dalam Pembelajaran Matematika Guna Meningkatkan Kemampuan Pemecahan Masalah Siswa. *PRISMA, Prosiding Seminar Nasional Matematika*. 2024;7:359-367.

[23] Rahayu WI, Bibi S, Arief MS. Perancangan media pembelajaran rangkaian listrik dasar menggunakan teknologi augmented reality melalui virtual laboratory. *Jurnal Pendidikan Informatika dan Sains*. 2022;11(2):200-210. doi:10.31571/saintek.v11i2.4714

[24] Nistrina K. Penerapan Augmented Reality dalam Media Pembelajaran. *Jurnal Sistem Informasi, J-SIKA*. 2021;03(01):1-6.

[25] Dessye J, Rachman RS, Wiliyanti V, Tumiwa J, Belajar H, Tinggi P. IMPLEMENTASI TEKNOLOGI AUGMENTED REALITY DALAM PEMBELAJARAN : DAMPAK TERHADAP HASIL BELAJAR. 2024;7:16198-16204.

[26] Al Ikhsan I, Supriadi N, Gunawan W. Media Pembelajaran Berbasis Augmented Reality: Materi Bangun Ruang Sisi Datar. *JKPM (Jurnal Kajian Pendidikan Matematika)*. 2022;7(2):289. doi:10.30998/jkpm.v7i2.12839

[27] Mislan, Sigit Mulyono. Potensi 3D printing sebagai media edukasi dalam pendidikan keperawatan. *Jurnal Cakrawala Ilmiah*. 2022;1(5):895-908. doi:10.53625/jcijurnalcakrawalailmiah.v1i5.1142

[28] Prasetya NWA, Linda Perdana Wanti, Lina Puspitasari. Teknologi Augmented Reality Untuk Terapi Pijat Wajah Ibu Hamil Dengan Preeklamsia. *Infotekmesin*. 2023;14(1):35-42. doi:10.35970/infotekmesin.v14i1.1635

[29] Sahida F, Nurfaizal Y, Waluyo R. Pemanfaatan Augmented Reality Sebagai Media Pembelajaran Protozoa. *Journal of Innovation Information Technology and Application (JINITA)*. 2020;2(02):99-106. doi:10.35970/jinita.v2i2.291

[30] Hidayat WN, Sutikno TA, Dwi C, Kartikasari I, Firdaus AF. PENINGKATAN KETERAMPILAN PEMBUATAN MEDIA PEMBELAJARAN BERBASIS AUGMENTED REALITY visi khusus . Visi yang ingin diwujudkan dari ketiga sekolah ini ialah informasi kepada siswa terkait subjek pelajaran . Hal ini berarti media menjadi. *Jurnal Graha Pengabdian*. 2019;1(2):93-103.

[31] Suryaningtyas C, Sutama. Pengembanagan Aplikasi Augmented Reality Berbasis Android Sebagai Media Pembelajaran IPA Pokok Bahasan Sifat dan Perubahan Wujud Benda untuk Sekolah Dasar. *Angewandte Chemie International Edition, 6(11), 951–952*. 2018;3(1):10-27.

[32] Idrus HH, Modding B, Basalamah S. Collective Competence as an Enable for Services Integration in Health and Social Care Services [Letter]. *JMDH*. 2022;Volume 15:2901-2902. doi:10.2147/JMDH.S401005

[33] Cherniaieva AA. Частота Асимптоматической Гиперурикемии Среди Взрослых Больных Сахарным Диабетом 1-Го И 2-Го Типа. *INTERNATIONAL JOURNAL OF ENDOCRINOLOGY (Ukraine)*. 2021;16(4):327-332. doi:10.22141/2224-0721.16.4.2020.208486

[34] Rahayu DA, Fakhrudin A, Mutiah C, et al. AUGMENTED (AR) DALAM. 2024;7:11995-12001.