Journal of Educational Research and Evaluation
Volume 8, Issue 3, 2024, pp. 461-468
P-ISSN: 2597-422x E-ISSN: 2549-2675
Open Access: https://doi.org/10.23887/jere.v8i3.77926

Utilization of Volleyball Teaching Materials Based on Augmented Reality

Asep Suharta[1*], Nurkadri[2], Rahma Dewi[3], Bessy Sitorus Pane[4], Muhammad Reza Destya[5]

[1,2,3,4] faculty of Sport Science, Universitas Negeri Medan, Medan, Indonesia
[5] Sport Science, Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

ARTICLE INFO

Article history:
Received May 02, 2024
Accepted August 12, 2024
Available online August 25, 2024

Kata Kunci :
Pengajaran Bola Voli, Augmented Reality, Research and Development (R&D).

Keywords:
Volleyball Teaching, Augmented Reality, Research and Development (R&D).

ABSTRAK

Banyak guru belum memiliki kemampuan yang memadai untuk menggunakan dan mengoperasikan teknologi pendidikan, terutama teknologi berbasis TIK. Sehingga perlu adanya inovasi dalam pengembangan bahan ajar, khususnya yang berbasis AR, untuk meningkatkan kualitas pembelajaran, minat, dan motivasi siswa, serta pemahaman konsep yang diajarkan. Penelitian ini bertujuan untuk mengembangkan bahan ajar materi bola voli berbasis augmented reality. Produk yang dihasilkan adalah bahan ajar materi bola voli berbasis augmented reality yang dapat dipergunakan bagi mahasiswa dan guru PJOK Jenis penelitian yang digunakan dalam penelitian ini adalah Research and Development (R&D) dengan menggunakan model penelitian ADDIE. Pada penelitian ini menggunakan subjek yang terdiri dari 30 mahasiswa, 1 ahli materi, 1 ahli media, dan 1 praktisi. Metode pengumpulan data yang digunakan adalah kuesioner dengan menggunakan instrumen berupa lembar kuesioner. Setelah data dikumpulkan kemudian dianalisis menggunakan metode analisis data kuantitatif dan kualitatif. Hasil uji coba. kelompok kecil disimpulkan bahwa Pengembangan bahan ajar materi bola voli berbasis augmented reality sudah memenuhi kriteria untuk dilanjutkan dalam uji kelompok kecil karena persentase bahan ajar materi bolavoli berbasis augmented reality 80% dan bahan ajar materi bola voli berbasis augmented reality setelah dilakukan uji kelompok besar sebesar 95%. Dapat disimpulkan bahwa, bahan ajar bola voli berbasis augmented reality dapat menilai kemampuan siswa. Penelitian ini diharapkan dapat menambah wawasan mahasiswa dalam bermain bola voli.

ABSTRACT

Many teachers need more ability to use and operate educational technology, especially ICT-based. So, there is a need for innovation in developing teaching materials, especially those based on AR, to improve the quality of learning, student interest and motivation, and understanding of the concepts taught. This research aims to develop teaching materials for volleyball based on augmented reality. The resulting product is augmented reality-based volleyball teaching materials that can be used for PJOK students and teachers. The type of research used in this study is Research and Development (R&D) using the ADDIE research model. This study uses subjects consisting of 30 students, one material expert, one media expert, and one practitioner. The data collection method used was a questionnaire using an instrument as a questionnaire sheet. After the data was collected, it was analyzed using quantitative and qualitative methods. The results of the small group test concluded that the development of teaching materials for augmented reality-based volleyball materials had met the criteria to continue in the small group test because the percentage of teaching materials for augmented reality-based volleyball materials was 80%, and teaching materials for augmented reality-based volleyball materials after an extensive group test of 95%. It can be concluded that augmented reality-based volleyball teaching materials can assess students' abilities. This research is expected to add insight into students' playing volleyball.

1. INTRODUCTION

The increasingly rapid development of science and technology requires us to always make updates in the use of technological results, especially in the field of education. Educational technology is the study and ethical practice of facilitating learning and improving performance by care, acting, using and managing appropriate technological processes and resources (Ridwan et al., 2021; Setia Hasibuan et al., 2023; Suharta et al., 2021; Supriadi et al., 2023; Supriadi & Dewi, 2022). Meanwhile, according to other researchers, educational technology is a profession that creates a learning process that is easy to obtain and utilized by many people. From this statement it can be concluded that educational technology is something that makes the learning process easier using existing technological resources. Due to technological developments, teaching staff are required to be able to use and operate technology that is

*Corresponding author.
E-mail addresses: asepshrt34@email.com (Asep Suharta)

able to support the learning process in the classroom (Berkseth & Berkseth, 2022; Rheinata & dkk, 2022). The demand that teaching staff be able to master technology has an impact on the new curriculum. According to other researchers, problems with the implementation of the 2013 curriculum include teacher books and student books experiencing distribution problems, teacher training has not been optimal, facilities and infrastructure do not support the teaching and learning process in the implementation of the 2013 curriculum, and teachers experience problems with ICT (Information Technology) based teaching. and Communication). In line with the statement above, the current fact is that the abilities of teachers in several schools are not sufficient to produce ICT-based learning media and products. So far, teachers have only relied on lectures, discussions, laboratory practice and field visits in the learning process. These curriculum changes have an impact on learning, one of which is learning physical education and PJOK sports (Agus Kamiana et al., 2019; Syamsuar & Zen, 2021). Physical education is essentially an educational process that utilizes physical activity to produce holistic changes in individual qualities, both physically, mentally, and emotionally (Dewi & Verawati, 2021; Imran Akhmad, 2022; Supriadi et al., 2023). Physical education treats the child as a whole unit, a total being, instead of just considering him as a person with separate physical and mental qualities. Physical education is an inseparable part of education in general that affects the potential of students in terms of cognitive, affective, and psychomotor through physical activity. Through physical activity children will gain a variety of valuable experiences for life such as intelligence, emotions, attention, cooperation, skills, and so on (Dewi & Faridah, 2022; Sinaga et al., 2022). Physical activity for physical education can be through sports or non-sports. The focus is on increasing human mobility more specifically, physical education is related to the relationship between human movement and other areas of education and the relationship from the development of the physical body to the mind and soul. Its focus on the influence of physical development on the region of growth and development of other aspects of humans is what makes it unique.

In PJOK learning, teaching materials are things that have an important role in supporting the learning process. Teaching materials are learning resources that have an important role in supporting the learning process. Teaching materials are a set of subject matter that refers to the curriculum used (in this case the lecture syllabus, subject syllabus, and/or diktat subject syllabus depending on the type of education provided) in order to achieve competency standards and basic competencies that have been determined. According to other researchers, teaching materials are materials (both information, tools and texts) that are arranged systematically, which display a complete figure of competencies that will be mastered by participants and used in the learning process with the aim of planning and reviewing learning implementation (Lestari, 2020; Prastyawan & Pulungan, 2022; Syamsuar & Zen, 2021). Based on the description above, it can be concluded that teaching materials are a set of learning plans that teachers use to help the learning process to achieve goals in competency standards and basic competencies. Augmented Reality (AR) is a breakthrough in human-machine interaction technology that attracts users because it can create computer-animated image effects in the real world. According to other researchers, AR is a technology that combines two-dimensional or three-dimensional virtual worlds into a three-dimensional natural environment and then projects these virtual objects in a real environment. In addition, other researchers also explain that AR is a technique that combines two-dimensional and three-dimensional virtual objects into a three-dimensional natural environment and then projects these virtual objects in real time (Abubakar, 2021; Mustaqim et al., 2017; Saputra et al., 2020). From some explanations of AR above, AR is a technology capable of adding virtual objects, both two-dimensional and three-dimensional, to real-world objects in real-time.

One way to facilitate interactive PJOK learning and measure students' concept understanding is to develop and implement Augmented Reality-based teaching materials. These teaching materials facilitate students to learn independently so that they can easily understand the material. In addition, teaching materials also help the success and achievement of learning objectives. The teaching materials developed in this study are presented and packaged with Augmented Reality technology, which combines two-dimensional and three-dimensional objects and then displays these objects in virtual form (Siegle, 2019; The utilization of augmented reality technology in teaching materials is expected to improve the quality of the learning process because it has been proven to increase students' interest in learning materials through exciting aspects that can increase their interest and motivation to learn. In addition, students can also get an atmosphere of learning and playing because when studying material, they can project it in real-time (Dedy et al., 2016; Siegle, 2019; Sudarmilah et al., 2019). Several studies are relevant to the current research. The first research aims to design augmented reality-based teaching materials using Android to learn flat shapes that are expected to be an innovator in learning flat shapes. This research is a type of qualitative research. The expected result is the design of augmented reality-based teaching materials. Second, research on the development of AR-based teaching materials that can increase student interest in learning, the use of AR technology in learning can help students to understand better and remember the

concepts taught, training participants gain skills to create AR-based teaching materials that can be used in contextual learning, this training provides opportunities for participants to collaborate and share experiences with other participants, and the use of AR technology in learning can improve the quality of learning and open opportunities to develop more creative and innovative teaching materials. Third, research that shows the use of Augmented Reality-based interactive teaching module development in Basic Network subjects at SMK Negeri 3 Singaraja can be categorized as very positive, with a percentage of 91% (Rafik Ainur, 2020; Ridwan et al., 2021; Setiawan & Martin, 2023). Finally, research shows that Augmented Reality-based teaching modules get an assessment from material expert validators with a percentage of 97.67%, an examination of media expert validators with a percentage of 93.44%, and an evaluation of practitioners with a rate of 94 31%. Thus, it can be concluded that the Augmented Reality-based teaching module is very feasible to be used by students in the history learning process with a percentage of 81.19% (Endriani, Akhmad, et al., 2022; Endriani, Sitompul, et al., 2022; Larasati & Widyasari, 2021; Novia Santi Lilis, 2022; Nuraini & Ratnawati, 2021). The novelty of this research is that AR-based teaching materials on volleyball material are designed using AR media, which is new in the technology used in sports. AR teaching materials for volleyball courses are expected to guide educators and students to achieve two goals at once, namely understanding the concepts of PJOK, especially volleyball teaching materials, linking them to the environment and technology, and being able to apply them in social life. Based on the description above, this study aims to determine the feasibility of AR-based volleyball teaching materials that have been developed and describe the concept understanding of students in using AR teaching materials, especially in volleyball material. The existence of this research is expected to add insight into students' playing volleyball. It can increase students' interest and motivation and help them understand the concepts taught better

2. METHODS

The type of research used in this study is Research and Development (R&D). R&D research is research used to produce products and test the effectiveness of products. The research model used is the ADDIE development model. The ADDIE research procedure has five stages: analysis, design, development, implementation, and evaluation (Fitria Hidayat, 2021; Maya Aristia & Risnovita Sari, 2024; Sugihartini & Yudiana, 2018) The brief procedure of the research conducted is, first, at the analysis stage, the activity carried out to analyze student needs. Second is the design stage, which is carried out to make the initial design of the developed media. Third, in the development stage, the activity is to develop the initial design made at the design stage. Fourth, in the implementation stage, the activities are conducting small and large group tests. Finally, in the evaluation stage, the activities carried out are to make revisions related to the products that have been made periodically. This research was conducted on students of the faculty of sports science, and the research subjects consisted of 30 students, 1 material expert, one media expert, and one practitioner. The object of this research is the Augmented Reality-based history learning module. In this study, data will be collected using data collection methods in the form of questionnaires with instruments in the form of questionnaire sheets. After the data is collected, it is analyzed using two types of data analysis methods: quantitative and qualitative. It should be noted that data analysis is an effort to find and organize the records of research results systematically (Fitria Hidayat, 2021; Rafik Ainur, 2020). Quantitative data analysis is used to determine the value obtained from the validation test results. The validation instrument sheet determines whether or not the teaching module is used. The method used is that each expert and practitioner is asked to choose answers matching the characteristics of the teaching module the researcher develops. Meanwhile, qualitative data analysis data is used to make improvements, which the validators have given through comments and suggestions on the validation sheet and the results of interviews with classroom teachers.

3. RESULT AND DISCUSSION

Results

The results of the research developed volleyball-based teaching materials augmented *reality* This is described based on each stage in development research which can be explained below. First, *Needs Analysis*. Development of volleyball-based teaching materials augmented *reality* is one of the important things in providing new learning experiences to students, with this student's can improve students' abilities in exploring technology and making teaching materials based on augmented *reality* can be used by teachers in teaching basic volleyball techniques. Development of volleyball-based teaching materials augmented *reality* is an important thing in a modification by linking it to the technology used, it will provide a new learning experience for students in learning volleyball and also being able to master a

certain technique in the game that drills while playing as a first step in developing learning-based learning. *augmented reality*. In its development, learning volleyball is very much based on the development of teaching materials that will provide stimulus for students in learning. Teaching materials augmented *reality* The volleyball course is expected to lead educators and students to achieve two goals at once, namely understanding students about PJOK concepts, especially volleyball teaching materials, relating them to the environment and technology, and being able to apply them in social life. Based on the description above, this research aims to determine the feasibility of volleyball-based teaching materials augmented *reality* which has been developed and describes students' conceptual understanding in using teaching materials augmented *reality* especially in volleyball material.

Second, *design stages*. At this stage, the researcher designs the teaching materials to be developed. The stages in designing teaching materials are, first, compiling learning materials according to the curriculum used at school; second, selecting supporting media for teaching modules to make them attractive; and finally, designing the initial teaching modules made as beautiful as possible. The applicable curriculum at school compiles learning materials. The main topic of volleyball learning is the basic techniques of playing volleyball. Assemblr EDU is used to create Augmented Reality content. Assemblr EDU is an Augmented Reality platform that allows users to easily design 2D/3D content visualized in the form of Augmented Reality. Meanwhile, Canva is used to design the entire module. The teaching module design made by researchers is as follows. First, create the dashboard menu. The dashboard menu is designed to fulfill the essential elements of volleyball techniques arranged systematically to provide an exciting learning experience for students. The dashboard menu display is presented in Figure 1.

Figure 1. Dashboard Menu Display

Second, augmented reality can be created in the form of QR codes. Maker is made to provide students with barcodes and allow them to view augmented reality applications designed by researchers. The fundamental difference in making this teaching material compared to other modules is that it is based on augmented reality, which can be accessed if students access the QR code through an application called Assemblr EDU. The existence of augmented reality-based teaching modules assisted by Assemblr EDU will make students' knowledge not only focus on reading modules but also on augmented reality content, in which there are videos about the material being studied. The appearance of the Barcode augmented reality is presented in Figure 2.

Figure 2. Barcode Augmented Reality

Third, Development Stages(Development). From the results of small group tests on volleyball course students after being given teaching materials based on augmented *reality* given a questionnaire to

fill out according to student understanding. From the results of small group trials, it was concluded that the development of volleyball-based teaching materials augmented *reality* has met the criteria to continue in the small group test because the percentage of volleyball-based teaching materials augmented *reality is 80%*. So, it can be concluded that the development of volleyball-based teaching materials augmented *reality. This* can increase student enthusiasm in learning basic volleyball technical skills by using technology as a learning tool. Development of volleyball-based teaching materials augmented *reality* meets the criteria for mass production because the percentage of volleyball-based teaching materials augmented *reality* after a large group test was 95%. It can be concluded that the teaching materials are volleyball based augmented *reality* This is easy to do and implement so that it can improve student learning in teaching and playing volleyball as well as broadening students' insight into playing volleyball as well as on volleyball-based teaching materials *augmented reality* has an element of play because this is very important in learning so that learning volleyball is not boring.

Discussion

The development of teaching materials in the Independent Curriculum era is a necessity. The Independent Curriculum (IKM) Implementation Process focuses on strengthening literacy, numeracy and digital competencies. One element of strengthening digital competence in improving literacy and numeracy skills is the development of technology-based teaching materials. The important role of technology in the 5.0 era means that most learning vehicles include technology. A form of technology that is still new in the development of teaching materials, namely Augmented Reality (AR). AR is an application for developing teaching materials that can combine the real world with the virtual world in two-dimensional or three-dimensional form projected in a real environment at the same time. The emergence of AR technology initially started in the world of games, then developed into an interesting and effective teaching method for students. The presence of AR began with Microsoft's XboX console which presented AR-based games. The technology used in AR can be said to be still new, because in 2015, AR began to develop and become a learning tool for every material and level of education (Mustaqim et al., 2017; Relji et al., 2021; Setiawan & Martin, 2023). Please note that AR media has a feature for recording 2D and 3D objects, which are then imported into the teaching material development platform. The development of AR into technological teaching materials for students is certainly something new and decisive. the important role of learning media is that it can be enjoyed pleasantly by students, then gives a meaningful impression to the learners themselves. AR can visualize various objects to be used as teaching materials and animations for each element of teaching materials. The current era of learning conditions still does not massively use technology as the core of developing teaching materials. However, efforts to familiarize technology-based teaching materials are a priority in learning the Independent Curriculum (KM) (Agus Kamiana et al., 2019; Akhsani et al., 2021; Dedy et al., 2016; Dwi Putra et al., 2023; Novia Santi Lilis, 2022).

One way that can be used to facilitate interactive PJOK learning which can also measure students' understanding of concepts is by developing and implementing teaching materials *augmented reality*. Teaching materials can facilitate students to learn independently so that students can easily understand material. Apart from that, teaching materials are also used to help the success and achievement of an instructional goal. The teaching materials developed in this research are presented and packaged with technology*Augmented reality*. *Augmented reality* is a technology that combines two-dimensional and three-dimensional objects, and then displays these objects in virtual form. Utilization of technology*Augmented reality* in teaching materials it is hoped that it can improve the quality of a learning process. Augmented *Reality has proven* to increase students' interest in learning material because*Augmented Reality* has attractive aspects that can increase students' interest and motivation to learn (Akhsani et al., 2021; Dewi & Faridah, 2022). Apart from that, students can also get an atmosphere of learning and playing because when studying material, they can project it in a real way. Several previous studies related to the use of augmented reality-based teaching materials. The teaching materials that had been developed were declared feasible in terms of material and media aspects and students' conceptual understanding in using I-SETS-based augmented reality teaching materials was relatively good. Augmented reality teaching materials integrated with I-SETS learning can improve understanding of biological material by linking science, environment, technology and society and are spiritually based (Berkseth & Berkseth, 2022; Sudarmilah et al., 2019).

The limitations of this study include several aspects. First, limitations in time, where developing and testing products requires a long enough time so that not all stages can be carried out optimally. Finally, limitations in sample size because this study only involved 30 students, one material expert, one media expert, and one practitioner, which may not represent the wider population. Therefore, to overcome these limitations, several solutions can be implemented. First, the research can be conducted over a more extended period to ensure each product development and testing stage is optimized. Finally,

the sample size should be expanded by involving more students, experts, and practitioners from various backgrounds to get more representative results. With these steps, the existing limitations can be minimized, and the research can provide more comprehensive and valuable results. The implications of this study show that the rapid development of educational technology requires teachers to better master and operate technology in the learning process. This skill is essential in implementing a curriculum emphasizing Information and Communication Technology (ICT). Teachers' lack of ability to produce ICT-based learning media and products poses challenges in implementing the new curriculum. In Physical Education, Sports, and Health (PJOK), technology-based teaching materials, such as Augmented Reality (AR), can be an innovative solution to facilitate more interactive and engaging learning. AR technology, combining two-dimensional and three-dimensional objects into a natural environment in real-time, can increase students' interest and motivation in learning and help them understand the concepts taught better. This research develops AR-based PJOK teaching materials, especially volleyball material, designed to help teachers provide more effective and exciting learning. This teaching material is expected to improve students' concept understanding and relate it to the environment and technology. AR in teaching materials is proven to improve the quality of learning and provide a more enjoyable learning experience for students. This shows that integrating technology in education, primarily AR-based teaching materials, can enhance learning outcomes and student creativity.

4. CONCLUSION

Based on data from the results of field tests conducted by researchers, it can be concluded that augmented reality-based volleyball teaching materials effectively assess student abilities. This is due to several factors. First, the development of this teaching material can improve the understanding of volleyball teaching material by using augmented reality learning media. Second, teaching materials that are simple, interesting, and contain elements of this game will create enthusiasm and fun so that students will be interested in playing and motivated to learn and achieve course learning objectives. Finally, developing augmented reality-based volleyball teaching materials helps improve volleyball playing skills.

5. ACKNOWLEDGE

The researcher would like to express his thanks to all the teams involved in this research, and to LPPM UNIMED as the research funder so that this article can be published well.

6. REFERENCES

Abubakar, S. R. (2021). Development of Augmented Reality-Based Learning Media in Early Childhood Learning. *KARMAPATI (Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika)*, *2*(1), 71–84. http://seameo-ceccep.org/journal/index.php/eccep/article/view/16.

Agus Kamiana, K., Windu, M., Kesiman, A., & Pradnyana, G. A. (2019). Pengembangan Augmented Reality Book Sebagai Media Pembelajaran Virus Berbasis Android. *KARMAPATI (Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika)*, *8*(2), 165–171. https://doi.org/10.23887/karmapati.v8i2.18351.

Akhsani, R., Mujiono, M., Video, P., Jaringan Komputer, A., & Komunitas Negeri Putra Sang Fajar Blitar, A. (2021). Pengembangan Media Pembelajaran Berbasis Augmented Reality Pada Lembar Kerja Siswa Kelas 3 Madrasah Ibtidaiyah Development Augmented Reality for Learning Media Based on Thrid Grade in Student Worksheets at Madrasah Ibtidaiyah. *Research : Journal of Computer*, *4*(1). https://scholar.archive.org/.

Berkseth, H. A., & Berkseth, H. (2022). The Effectiveness of Manipulatives in the Elementary School Classroom. *Asian Journal of Education and Human Development*, *3*(1). https://doi.org/10.69566/ajehd.v3i1.41.

Dedy, R., Budiman, A., & Pd, M. (2016). Developing Learning Media Based On Augmented Reality (Ar) To Improve Learning Motivation. *Journal of Education, Teaching and Learning*, *1*(2), 89–94. https://www.learntechlib.org/p/209026/.

Dewi, R., & Faridah, E. (2022). Method and Motivation in Teaching Elementary School Students to Throw and Catch the Ball. *Jurnal Pendidikan*, *14*(3), 3507–3516. https://doi.org/10.35445/alishlah.v14i3.1635.

Dewi, R., & Verawati, I. (2021). The Effect of Manipulative Games to Improve Fundamental Motor Skills in Elementary School Students. *International Journal of Education in Mathematics, Science and Technology*, *10*(1), 24–37. https://doi.org/10.46328/ijemst.2163.

Dwi Putra, A., Ridho, M., Susanto, D., & Fernando, Y. (2023). Penerapan MDLC Pada Pembelajaran Aksara Lampung Menggunakan Teknologi Augmented Reality. *CHAIN: Journal of Computer Technology, Computer Engineering, and Informatics*, *1*(2), 32–34. https://doi.org/10.58602/chain.v1i2.29.

Endriani, D., Akhmad, I., & Daulay, B. (2022). Development of E-Book Based Volleyball Learning Model. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *6*(2), 363–370. https://doi.org/10.33369/jk.v6i2.21915.

Endriani, D., Sitompul, H., Mursid, R., & Dewi, R. (2022). Development of a Lower Passing Model for Volleyball Based Umbrella Learning Approach. *International Journal of Education in Mathematics, Science and Technology*, *10*(3), 681–694. https://doi.org/10.46328/ijemst.2508.

Fitria Hidayat, M. N. (2021). Model Addie (Analysis, Design, Development, Implementation And Evaluation Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal. Uinsgd*, *1*(1), 28–37. https://journal.uinsgd.ac.id/index.php/jipai.

Imran Akhmad, S. H. R. D. A. S. (2022). The Effects of Learning Strategies on Senior High School Students' Motivation and Learning Outcomes of Overhead Passing in Volleyball. *International Journal of Education in Mathematics, Science and Technology*, *10*(2), 512–527. https://doi.org/10.46328/IJEMST.2291.

Larasati, N. I., & Widyasari, N. (2021). Penerapan Media Pembelajaran Berbasis Augmented Reality Terhadap Peningkatan Pemahaman Matematis Siswa Ditinjau Dari Gaya Belajar. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *7*(1), 45. https://doi.org/10.24853/fbc.7.1.45-50.

Lestari, H. (2020). Hubungan Kelentukan Otot Pinggang Dengan Kemampuan Lempar Lembing Pada Siswa Smp Negeri 42 Palembang Relationship Between The Waist Muscle With Javelin Ability On The Student Of Junior High School 42, Palembang. *Jurnal Ilmu Keolahragaan*, *3*(1), 102–111. https://doi.org/10.31851/hon.v3i1.3741.

Maya Aristia, & Risnovita Sari. (2024). Development of B1 Level Listening Learning Media Using the Proprofs Platform. *Asian Journal of Applied Education (AJAE)*, *3*(2), 157–166. https://doi.org/10.55927/ajae.v3i2.8790.

Mustaqim, I., Pd, S. T., & Kurniawan, N. (2017). Pengembangan Media Pembelajaran Berbasis Augmented Reality. *Edukasi Elektro*, *1*(1), 36–48. http://journal.uny.ac.id/index.php/jee/.

Novia Santi Lilis, N. K. M. (2022). Pengembangan Buku Berbasis Augmented Reality (AR) Menggunakan Assemblr APPS Pada Tema 9. *Journal2. Um*, *31*(2), 78–86. http://journal2.um.ac.id/index.php/sd.

Nuraini, L., & Ratnawati, D. (2021). Pemanfaatan Teknologi Augmented Reality Untuk Pengembangan Bahan Ajar Materi Komputer Jaringan Article history. *Jurnal Edukasi Elektro*, *5*(2), 111–119. https://journal.uny.ac.id/index.php/jee.

Prastyawan, R. R., & Pulungan, K. A. (2022). Signifikansi Kebugaran Jasmani Terhadap Prestasi Belajar Siswa Sekolah Dasar. *Jurnal Pendidikan Jasmani Indonesia*, *18*(2), 185–193. https://doi.org/10.21831/jpji.v18i2.55859.

Rafik Ainur, S. B. N. I. (2020). Pengembangan Bahan Ajar Augmented Reality Berbasis I-Sets Terhadap Pemahaman Konsep Peserta Didik. *Jurnal Acieh*, *1*(1), 167–182. https://doi.org/10.1016/j.stueduc.2020.100892.

Relji, V., Milenković, I., Dudi´c, S., Šulc, J., & Baj˘c, B. (2021). applied sciences Augmented Reality Applications in Industry 4 . 0 Environment. *Applied Sciences*, *11*(12), 5592. https://doi.org/10.3390/app11125592.

Rheinata, S., & dkk. (2022). Inovasi pembelajaran berbasis teknologi Artificial Intelligence dalam Pendidikan di era industry 4.0 dan society 5.0. *Jurnal Penelitian Sains Dan Pendidikan*, *2*(2), 192–198. https://e-journal.iain-palangkaraya.ac.id/index.php/mipa/.

Ridwan, M., Ristanto, K. O., Aryanandha, I. D. M., Yuhantini, E. F., & Fikri, M. D. (2021). Pemanfaatan Teknologi Pembelajaran Bagi Guru PJOK. *Jurnal Pengabdian Olahraga Masyarakat (JPOM*, *2*(2), 40–44. https://doi.org/10.26877/jpom.v2i2.10005.

Saputra, H. N., Salim, Idhayani, N., & Prasetiyo, T. K. (2020). Augmented Reality-Based Learning Media Development. *AL-ISHLAH: Jurnal Pendidikan*, *12*(2). https://doi.org/10.35445/alishlah.v12.i2.258.

Setia Hasibuan, B., Tantri, A., & Reza Destya, M. (2023). Kinestetik : Jurnal Ilmiah Pendidikan Jasmani Plan Prototype Microcontroller based 30 Meter Running Speed Test Equipment. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *7*(4). https://doi.org/10.33369/jk.v7i4.29583.

Setiawan, I., & Martin, N. (2023). Pengembangan Bahan Ajar Bahasa Indonesia Berbasis Augmented Reality Pada Guru Sdn 2 Pancor. *Jurnal Pengabdian Kepada Masyarakat Berkemajuan*, *7*(2), 898–905. http://journal.ummat.ac.id/index.php/index/oai.

Siegle, D. (2019). Seeing Is Believing: Using Virtual and Augmented Reality to Enhance Student Learning. *Gifted Child Today*, *42*(1), 46–52. https://doi.org/10.1177/1076217518804854.

Sinaga, F., Reza Destya, M., Negeri, S., Dairi, K., & Kepelatihan Olahraga, P. (2022). Giving Sports Burden to Behavior of Students of the Faculty of Sports Science, Universitas Negeri Medan. *East Asian Journal of Multidisciplinary Research (EAJMR*, *1*(8), 1519–1526. https://journal.formosapublisher.org/index.php/eajmr/index.

Sudarmilah, E., Ustia, N., & Nuryanto Bakhtiar, D. (2019). Learning Media based on Augmented Reality Game Video games Stimulate Cognitive Abilities of Children View project Augmented Reality Educational Game View project Learning Media based on Augmented Reality Game. *International Journal of Engineering & Technology*, *8*(1), 154–157. https://doi.org/10.14419/ijet.v8i1.1.24653.

Sugihartini, N., & Yudiana, K. (2018). Addie Sebagai Model Pengembangan Media Instruksional Edukatif (Mie) Mata Kuliah Kurikulum Dan Pengajaran. *Jurnal Pendidikan Teknologi Dan Kejuruan*, *15*(2), 277. https://ejournal.undiksha.ac.id/index.php/JPTK/issue/view/851.

Suharta, A., Supriadi, A., & Nurkadri, N. (2021). Design of Digital Based Volley Ball Basic Techniques Test Instrument. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, *4*(2), 3170–3176. https://doi.org/10.33258/birci.v4i2.2049.

Supriadi, A., & Dewi, R. (2022). The Effectiveness of Learning Media and Motivation on Dribbling Learning Outcomes in Football Game. *Journal of Positive School Psychology*, *22*(6). https://journalppw.com/index.php/jpsp/article/view/6925.

Supriadi, A., Mesnan, A., F., D., R., M., & Farooque, S. M. (2023). Enhancing goalkeeper reaction speed in football: The impact of ball launcher training in physical training methods. *Journal Sport Area*, *8*(3), 447–456. https://doi.org/10.25299/sportarea.2023.

Syamsuar, S., & Zen, Z. (2021). Teaching Game For Understanding Model: Increasing Motivation And Students' Physical Fitness. *JPPI (Jurnal Penelitian Pendidikan Indonesia*, *7*(1), 128–136. https://doi.org/10.29210/02021951.