



HJSE

Holistic Journal of Sport Education

E-ISSN: 2809-9974

<https://journal.uniga.ac.id/index.php/penjas>

DOI: 10.52434/penjas.v5i2.44242



THE EFFECT OF USING AUDIOVISUAL MEDIA IN PHYSICAL EDUCATION CLASSES ON IMPROVING STUDENT MOTIVATION IN ELEMENTARY SCHOOLS

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Keywords:

Learning
Outcomes,
Audiovisual Media;
Physical Education.

Abstract

The success of Physical Education, Sports, and Health (PJOK) instruction is greatly influenced by teachers' ability to create engaging and innovative learning processes that enhance students' motivation to learn. This study aims to analyze and determine the effect of using audiovisual media on students' motivation to learn in Physical Education, Sports, and Health (PJOK) classes in elementary school. This study employed the Classroom Action Research (CAR) method, which aims to improve and enhance the quality of the PJOK learning process through the use of audiovisual media. The research was conducted at SD Inpres 41 in Sorong Regency during the second semester of the 2025/2026 academic year. The research subjects were 25 fifth-grade students at SD Inpres 41 in Sorong Regency, consisting of 13 boys and 12 girls. The validity of the research instruments was tested using content validity. The research results showed that in Cycle I, Session 1, the average score was 63.5 and the mastery rate was 30%. In Cycle I, Session 2, the average score was 75 and the mastery rate was 75%. In Cycle II, Session 1, the average score was 65.5 and the mastery rate was 35%. In Cycle II, the second session had an average score of 78.5 and a mastery rate of 95%. In Cycle III, the first session had an average score of 62 and a mastery rate of 30%. In Cycle III, the second session had an average score of 79 and a mastery rate of 95%. In conclusion, the results of Cycle I, Cycle II (first and second sessions) show an increase in the average scores and mastery rates of students in physical education, sports, and health classes, indicating that the use of audiovisual media can improve student learning outcomes.

Received: April 14, 2026

Accepted: June 13, 2026

Published: June 30, 2026

Authors' contribution:

A - Conception and design of the study; B - Acquisition of data; C - Analysis and interpretation of data; D - Manuscript preparation; E - Obtaining funding.

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INTRODUCTION

Physical Education, Sports, and Health (PJOK) is one of the subjects that plays a crucial role in supporting students' holistic development—physically, cognitively, emotionally, and socially (Athaya et al., 2023; Ebrahim & Hussein, 2025; Yusroni, 2024). Through PJOK instruction, students not only acquire motor skills and physical fitness but also develop the values of sportsmanship, discipline, cooperation, responsibility, and a healthy lifestyle necessary for daily life. At the elementary school level, PJOK serves as a vital foundation for character building and fostering active lifestyles from an early age. Therefore, the success of PJOK instruction is heavily influenced by teachers' ability to create engaging, innovative learning processes that enhance students' motivation to learn (Barnett, Mazzoli, Hawkins, et al., 2022; Popović, 2017).

Advances in information and communication technology have brought significant changes to the world of education. The use of technology as a learning medium is one strategy that can improve the quality of the teaching and learning process. One medium considered effective is audiovisual media—media that combines sound and images to provide a learning experience that is more concrete, engaging, and easy for students to understand. The use of audiovisual media allows students to receive information through more than one sense, thereby increasing their attention, interest, and engagement in learning. Several studies indicate that audiovisual media can boost student motivation and participation in the learning process because the material is presented in a more interactive and contextual manner (Keriven et al., 2025; Nur et al., 2023; Rusdi et al., 2020).

The urgency of using audiovisual media is increasing alongside the implementation of the Merdeka Curriculum, which emphasizes active, creative, innovative, and learner-centered learning. Furthermore, digital transformation in education has become a global agenda that promotes the use of technology as an effective learning tool (Haqiyah & Riyadi, 2017; Ilham et al., 2023; Yuan et al., 2021). In Indonesia, increased access to digital devices and the internet provides greater opportunities for schools to integrate technology-based media into learning. This situation presents an opportunity for Physical Education (PJOK) teachers to deliver more engaging lessons tailored to the characteristics of elementary school students, who tend to prefer visual and interactive media. Nevertheless, student motivation in Physical Education (PJOK) lessons remains a challenge in many elementary schools. Some students still view Physical Education and Health (PJOK) merely as physical activities without understanding the broader learning objectives. Instruction that remains dominated by lectures and simple demonstrations often leads to students lacking enthusiasm for the learning process. Low learning motivation results in low student participation and suboptimal achievement of expected learning outcomes. This phenomenon was also observed among fourth-grade students at SD Inpres 41 in Sorong Regency. Based on initial observations, it was found that most students were

uninterested in Physical Education, Health, and Sports (PJOK) lessons because the instructional media used were monotonous and lacked variety. Teachers frequently relied on lectures and assignments without engaging media, causing students to become easily bored and struggle to understand the material.

Previous research studies have shown that audiovisual media have a positive impact on the learning process. Lutfhi & Rahayu, (2022) study found that the use of audiovisual media can increase students' interest and motivation in Physical Education (PJOK) classes. The findings of Barnett, Mazzoli, Bowe, et al., (2022); Nugraha & Ilham, (2022) also indicate that audiovisual media are effective in enhancing student engagement and helping teachers present material in a more engaging and easily understandable manner. Furthermore, research by Kusmiyati et al., (2024) revealed that audiovisual media can increase students' attention and participation in learning activities. These findings indicate that audiovisual media hold great potential for supporting the effectiveness of learning in schools. Although various studies have examined the effectiveness of audiovisual media, most previous research has focused primarily on improving students' academic achievement and motor skills. Studies specifically analyzing the impact of audiovisual media use on students' learning motivation in Physical Education (PJOK) at the elementary school level—particularly within the context of Sorong Regency—remain relatively limited. Furthermore, the social, cultural, and geographical characteristics of the Southwest Papua region may result in research findings that differ from those in other parts of Indonesia. Given this research gap, the novelty of this study lies in its focus on the effect of audiovisual media use on students' learning motivation in the Physical Education (PJOK) subject at SD Inpres 41 in Sorong Regency. This study provides more contextually relevant empirical evidence regarding the effectiveness of audiovisual media in enhancing the learning motivation of elementary school students in the South West Papua region, an area that has received little research attention.

Based on this description, the research problem is whether the use of audiovisual media influences students' learning motivation in Physical Education, Sports, and Health (PJOK) at SD Inpres 41 in Sorong Regency. Thus, the objective of this study is to analyze and determine the influence of audiovisual media use on students' learning motivation in Physical Education, Sports, and Health (PJOK) at SD Inpres 41 in Sorong Regency.

RESEARCH METHODS

Study design

This study employed the Classroom Action Research (CAR) method, which aims to improve and enhance the quality of the Physical Education (PJOK) learning process through the use of audiovisual media. Classroom action research is a form of reflective research conducted by teachers or researchers within the classroom to continuously improve teaching practices (Arikunto, 2009, 2017; Muthoharoh & Nugraheni, 2020).

The study was conducted in two cycles, each consisting of four stages: planning, implementation of actions, observation, and reflection. During the planning stage, the researcher developed instructional materials, prepared learning content, audiovisual media, research instruments, and observation sheets. The action implementation stage involved applying instruction using audiovisual media on the basic technique of kicking a ball with the inside and outside of the foot. During the learning process, observations were made to monitor the activities of the teacher and students. The observation results were then analyzed during the reflection stage to serve as the basis for improving actions in the next cycle. The research instruments used included observation sheets, a learning motivation questionnaire, a cognitive learning outcome test, and documentation. Observation sheets were used to monitor teacher and student activities during the learning process. Questionnaires were used to measure students' levels of learning motivation after participating in lessons using audiovisual media. Learning outcome tests were used to assess students' mastery of the taught material, while documentation was used to supplement the research data in the form of activity photos and other supporting documents.

Participants

The study was conducted at SD Inpres 41 in Sorong Regency during the second semester of the 2025/2026 school year. The research subjects were 25 fifth-grade students at SD Inpres 41 in Sorong Regency, consisting of 13 boys and 12 girls. The selection of research subjects was based on the results of preliminary observations indicating that student motivation and learning outcomes in the subject of Physical Education, Sports, and Health (PJOK) were still relatively low.

Statistical analysis

The validity of the research instruments was tested using content validity. The instruments were first reviewed by an expert (expert judgment) with expertise in Physical Education, Sports, and Health. The instruments were deemed suitable for use upon receiving approval and recommendations from the validator. Data collection techniques included observation, questionnaire distribution, testing, and documentation. Observations were conducted during the learning process to gather data on teacher and student activities. Questionnaires were administered to students to determine their level of learning motivation after the implementation of audiovisual media. Tests were administered at the end of each cycle to measure student learning outcomes, while documentation served as supporting data for the study. Data analysis was conducted using both quantitative and qualitative descriptive methods. Data from observations and questionnaires were analyzed descriptively to illustrate changes in students' learning motivation during the implementation of the intervention. The criteria for the success of the intervention were set such that at least 80% of students would achieve the "high learning motivation" category and score above the Learning Objective Achievement Criteria (KKTP) established by the school. The results of the

analysis in each cycle were used as a basis for reflection to determine improvements for the next cycle.

RESULTS AND DISCUSSION

Results

The implementation of audiovisual media in Physical Education, Sports, and Health (PJOK) learning demonstrated a consistent improvement in students' learning outcomes across all instructional cycles. The intervention was conducted on three fundamental soccer skills, namely kicking, stopping, and dribbling the ball.

Table 1 presents the progression of students' learning achievement throughout the learning cycles. During Cycle I, which focused on kicking skills, only 6 out of 20 students (30%) achieved the minimum mastery criterion during the first meeting, with a mean score of 63.5. Following improvements in the instructional process and continued use of audiovisual media, the number of students achieving mastery increased to 15 (75%) in the second meeting, accompanied by an increase in the mean score to 75.0.

In Cycle II, the instructional focus shifted to ball-stopping skills. At the first meeting, 7 students (35%) achieved mastery, with a mean score of 65.5. After the second meeting, substantial improvement was observed, as 19 students (95%) met the mastery criterion and the mean score increased to 79.0. This finding suggests that audiovisual media effectively facilitated students' understanding and execution of ball-stopping techniques.

Similarly, Cycle III addressed dribbling skills. The percentage of students achieving mastery increased from 30% in the first meeting to 95% in the second meeting. Although the initial performance indicated that many students still experienced difficulties in mastering dribbling techniques, repeated exposure to audiovisual demonstrations and guided practice contributed to a significant improvement in learning outcomes.

Overall, the findings indicate that audiovisual media had a positive effect on students' learning achievement in soccer-related PJOK lessons. The most substantial improvement was observed in dribbling skills, with an increase of 65 percentage points in learning mastery, followed by ball-stopping skills (60 percentage points) and kicking skills (45 percentage points).

Table 1
Students' Learning Outcomes Across Learning Cycles

Cycle	Learning Material	Meeting	Students Achieving Mastery (n)	Mastery Percentage (%)	Mean Score
I	Kicking the Ball	First	6	30	63.5
I	Kicking the Ball	Second	15	75	75.0

II	Stopping the Ball	First	7	35	65.5
II	Stopping the Ball	Second	19	95	79.0
III	Dribbling the Ball	First	6	30	–
III	Dribbling the Ball	Second	19	95	79.0

Table 2
Improvement in Learning Mastery Across Soccer Skills

Learning Material	Initial Mastery (%)	Final Mastery (%)	Improvement (%)
Kicking the Ball	30	75	45
Stopping the Ball	35	95	60
Dribbling the Ball	30	95	65

The results indicate that the integration of audiovisual media substantially improved students' mastery of fundamental soccer skills. The visual and auditory demonstrations provided through instructional videos enabled students to better understand movement patterns, observe correct techniques, and apply them during practical activities. Consequently, students showed higher levels of learning achievement and mastery across all instructional materials.

Discussion

The findings of this study demonstrate that the implementation of audiovisual media significantly improved students' learning outcomes in Physical Education, Sports, and Health (PJOK), particularly in mastering fundamental soccer skills such as kicking, stopping, and dribbling the ball. The increase in learning mastery from 30% to 75% in kicking skills, from 35% to 95% in stopping skills, and from 30% to 95% in dribbling skills indicates that audiovisual media can facilitate students' understanding of movement patterns and technical execution. These findings support the Cognitive Theory of Multimedia Learning, which states that students learn more effectively when information is presented through a combination of visual and auditory channels, enabling deeper cognitive processing and knowledge retention (Marougkas et al., 2023; Saeed, 2016; Vieyra & González, 2020).

The improvement in kicking skills observed in Cycle I can be attributed to the ability of audiovisual media to provide clear demonstrations of body positioning, foot placement, and ball contact. Traditional verbal explanations often limit students' ability to visualize movement sequences accurately. By observing instructional videos repeatedly, students can develop a better understanding of motor patterns before performing them in practice. This finding is consistent with previous research showing

that video-based instruction enhances motor skill acquisition and procedural understanding among elementary school students (Mashud et al., 2023; Tanri et al., 2023; Zeng, 2020). Furthermore, audiovisual demonstrations reduce cognitive ambiguity and allow learners to compare their performance with ideal movement models.

The substantial increase in learning outcomes during the ball-stopping lessons supports previous evidence that observational learning plays a crucial role in physical education settings. According to Social Learning Theory, learners acquire new motor behaviors through observation, imitation, and repeated practice (Bandura, 1986). The instructional videos enabled students to observe proper stopping techniques from multiple angles and at different speeds, thereby improving their technical comprehension. Similar findings were reported by Kharisma & Yana, (2021), who found that digital video resources enhanced students' technical execution and engagement during sports instruction. Therefore, audiovisual media may serve as an effective tool for bridging the gap between theoretical explanation and practical application.

The highest improvement occurred in dribbling skills, where learning mastery increased by 65 percentage points. This finding suggests that audiovisual media may be particularly effective for teaching dynamic and complex motor skills that require coordination, timing, and spatial awareness. Dribbling involves continuous movement adjustments that are often difficult to explain verbally. Through audiovisual presentations, students can observe movement rhythms, body balance, and footwork patterns in real-time, facilitating more accurate skill replication. Similar conclusions were reached by Sham et al., (2023), who reported that multimedia-supported learning environments significantly improved students' psychomotor performance and learning effectiveness in practical educational contexts.

Another important finding is that audiovisual media appeared to increase students' engagement and participation during learning activities. Throughout the implementation process, students showed greater enthusiasm and attention when instructional videos were used. Increased engagement may have contributed to the observed improvements in learning outcomes because motivated learners tend to invest greater effort in practice and skill refinement. This result aligns with previous studies indicating that multimedia-based learning environments enhance students' intrinsic motivation, learning interest, and active participation in physical education classes (Qin, 2017; Singh et al., 2024). Consequently, audiovisual media not only functions as a content delivery tool but also as a motivational resource that supports meaningful learning experiences.

Overall, the findings reinforce growing evidence that technology-enhanced learning can improve educational outcomes in physical education. The combination of visual demonstrations, auditory explanations, and practical activities creates a learning environment that supports cognitive, affective, and psychomotor development simultaneously. Previous systematic reviews have highlighted that digital learning

resources can facilitate skill acquisition, increase student engagement, and improve learning achievement in sports education contexts (Dewantara et al., 2024; Rozi et al., 2023; Suryadi et al., 2022; Suryadi & Rubiyatno, 2022). Therefore, integrating audiovisual media into elementary physical education instruction may represent an effective pedagogical strategy for improving both learning processes and outcomes.

Study Limitations

Several limitations should be acknowledged when interpreting the findings of this study. First, the study was conducted in a single elementary school with a relatively small sample size of 20 students, limiting the generalizability of the results to broader educational contexts. Second, the research employed a classroom action research design without a control group, making it difficult to isolate the effect of audiovisual media from other factors that may have influenced learning outcomes. Third, the intervention focused exclusively on soccer skills, and therefore the effectiveness of audiovisual media for other physical education topics remains uncertain. Future studies are encouraged to involve larger and more diverse samples, utilize experimental or quasi-experimental designs, and investigate the long-term effects of audiovisual learning media across different sports and educational levels.

CONCLUSION

This classroom action research shows that the use of audiovisual media is effective in improving learning outcomes in Physical Education, Sports, and Health (PJOK) for soccer-related material in the fifth grade at SD Inpres 41 in Sorong Regency. Improvements in learning outcomes were observed in each topic taught: kicking the ball, stopping the ball, and dribbling the ball. In the kicking the ball module, the learning achievement rate increased from 30% in the first session to 75% in the second session. In the stopping the ball module, learning achievement increased from 35% to 95%, while in the dribbling the ball module, it increased from 30% to 95%. These improvements indicate that audiovisual media can help students understand the basic concepts and techniques of soccer more clearly through a combination of engaging visual and audio elements. In addition to enhancing understanding of the material, the use of audiovisual media also increases student engagement and participation during the learning process. Thus, audiovisual media can serve as an effective alternative learning strategy to improve physical education learning outcomes at the elementary school level.

Conflict of interest

The authors declare no conflict of interest.

Funding

No external funding information was provided for this revision.

REFERENCES

- Arikunto, S. (2009). *Dasar-Dasar Evaluasi Pendidikan*. Jakarta : BumiAksara.
- Arikunto, S. (2017). *Prosedur Penelitian Suatu Pendekatan Praktek*. PT Rineka Cipta.
- Athaya, H., Dewantara, J., Husein, M., Taiar, R., Malek, N. F. A., & Shukla, M. (2023). Analysis of physical fitness in students: a comparative study based on social status. *Tanjungpura Journal of Coaching Research*, 1(3), 71–78. <https://doi.org/10.26418/tajor.v1i3.66542>
- Barnett, L. M., Mazzoli, E., Bowe, S. J., Lander, N., & Salmon, J. (2022). Reliability and validity of the PL-C Quest, a scale designed to assess children's self-reported physical literacy. *Psychology of Sport and Exercise*, 60, 102164. <https://doi.org/https://doi.org/10.1016/j.psychsport.2022.102164>
- Barnett, L. M., Mazzoli, E., Hawkins, M., Lander, N., Lubans, D. R., Caldwell, S., Comis, P., Keegan, R. J., Cairney, J., Dudley, D., Stewart, R. L., Long, G., Schranz, N., Brown, T. D., & Salmon, J. (2022). Development of a self-report scale to assess children's perceived physical literacy. *Physical Education and Sport Pedagogy*, 27(1), 91–116. <https://doi.org/10.1080/17408989.2020.1849596>
- Dewantara, J., Yuniana, R., Graha, A. S., Sastaman B, P., Kushartanti, B. M. W., Nasrulloh, A., Septianto, I., Suryadi, D., Ardian, R., Widodo, A., Ridwan, A., & Haidar, M. D. (2024). What is the effectiveness of the combination of massage therapy and heat therapy on joint range of motion? Experimental study in patients with shoulder pain. *Retos*, 57(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 147–152. <https://doi.org/10.47197/retos.v57.104224>
- Ebrahim, T. Y., & Hussein, S. A.-H. J. A. (2025). The effectiveness of experiential learning strategy to developing some fixed-case football plans for students. *Tanjungpura Journal of Coaching Research*, 3(2), 133–143. <https://doi.org/10.26418/tajor.v3i2.90311>
- Haqiyah, A., & Riyadi, D. N. (2017). Contribution of Intelligence and Physical Condition on the Punch and Kick Pencak Silat. In *2nd International Conference on Sports Science, Health and Physical Education*. SCITEPRESS - Science and Technology Publications. <https://doi.org/10.5220/0007058902430246>
- Ilham, A., Amri, M. F. L., Isnanto, J., & Kadir, S. S. (2023). Evaluation of Physical Exercise Program of Table Tennis Club in Bengkulu City. *Journal Of Economics, Technology and Business*, 2(7), 500–510. <https://doi.org/10.57185/jetbis.v2i7.66>
- Keriven, H., Sánchez-Sierra, A., De-la-plaza-San-Frutos, M., García-Pérez-de-Sevilla, G., Clemente-Suarez, V., Garcia-Laredo, E., Saenz-Bravo, M., Owoeye, O. B. A., Miñambres-Martín, D., & Domínguez-Balmaseda, D. (2025). Psychological wellbeing of student-athletes: a comparative study between European and American athletes. *Frontiers in Psychology*, 16, 1604783. <https://doi.org/10.3389/fpsyg.2025.1604783>
- Kharisma, L. P. I., & Yana, Y. H. (2021). Media Pembelajaran Matematika dengan Materi Bangun Datar dan Bangun Ruang Berbasis Web. *JTIM: Jurnal Teknologi Informasi Dan Multimedia*. <https://doi.org/10.35746/jtim.v3i1.128>
- Kusmiyati, K., Setiawati, H., Setijono, H., Soedjatmiko, S., Kristiyanto, A., & Suryadi, D. (2024). Self-efficacy of physical education teachers: how does it contribute to

- achieving the overarching objectives of national sport? *Retos*, 58(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 546–551. <https://doi.org/10.47197/retos.v58.108159>
- Lutfhi, F., & Rahayu, E. T. (2022). Upaya Meningkatkan Kemampuan Teknik Dasar Atletik Nomor Lari Sprint Siswa SMP melalui Penggunaan Media Audiovisual. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga*, 5(2), 186–193. <https://doi.org/10.31539/jpjo.v5i2.3612>
- Maroungkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. In *Electronics (Switzerland)*. <https://doi.org/10.3390/electronics12132832>
- Mashud, Arifin, S., Kristiyandaru, A., Samodra, Y. T. J., Santika, I. G. P. N. A., & Suryadi, D. (2023). Integration of project based learning models with interactive multimedia: Innovative efforts to improve student breaststroke swimming skills. *Physical Education of Students*, 27(3), 118–125. <https://doi.org/10.15561/20755279.2023.0304>
- Muthoharoh, S., & Nugraheni, A. P. (2020). Evaluasi Penerapan SIMDA Keuangan Pada Dinas Kepemudaan Olahraga Dan Pariwisata Kota Magelang. *ADI Bisnis Digital Interdisiplin Jurnal*. <https://doi.org/10.34306/abdi.v1i2.221>
- Nugraha, H., & Ilham, Z. (2022). Pengembangan Media Stop Chassing The Ball Dalam Permainan Sepak Bola. ... *Journal of Physical Education and ...*
- Nur, L., Hong, F., Al Ardha, M. A., Burhaein, E., & Malik, A. A. (2023). Direct Instruction with Task Sheet-Based Learning Model: An Alternative Approach to Encourage Learning Motivation during the Covid-19 Crisis. *International Journal of Instruction*. <https://doi.org/10.29333/iji.2023.16345a>
- Popović, R. (2017). Evaluation of the Physical Fitness Level in Physical Education Female Students Using “Eurofit-Test”; *International Journal of Sports Science and Physical Education*. <https://doi.org/10.11648/j.ijsspe.20170201.11>
- Qin, J. (2017). Design and implementation of sports performance management system in higher vocational colleges based on data mining. *ICMTEL 2016 - 1st EAI International Conference on Multimedia Technology and Enhanced Learning*. <https://doi.org/10.4108/eai.28-2-2017.152304>
- Rozi, M. F., Resmana, R., Selviani, I., Okilanda, A., Sumantri, R. J., Suganda, M. A., & Suryadi, D. (2023). Imagery and Agility Training: How do They Affect the Reaction Ability of Futsal Goalkeepers? *Physical Education Theory and Methodology*, 23(3), 325–332. <https://doi.org/10.17309/tmfv.2023.3.02>
- Rusdi, R., Dlis, F., Lubis, J., Nata, A. D., & Whalsen, W. (2020). The Effect of Teaching Style Prattice, Reciprocity, Inclusion and Learning Motivation on Butterfly Swimming Skills. *Kinestetik: Jurnal Ilmiah Pendidikan Jasmani*, 4(2), 63–69. <https://doi.org/10.33369/jk.v4i2.12574>
- Saeed, O. A. (2016). The impact and clarity of presentation using multimedia learning system in the learning of swimming of back among students Specialized schools. *Sciences Journal Of Physical Education*, 9(3), 1–16. <https://www.iasj.net/iasj/article/125482>
- Sham, M. A., Sabri, M. H., Hamzah, U., & Zurina Yasak Rozitah, A.-M. S. (2023). Development of an Android Application for 3D Animation of Basic Silat Techniques in the Art of Self-Defence. *Research and Innovation in Technical and Vocational Education and Training*, 3(2 SE-MULTIMEDIA CREATIVE), 163–175.

- Singh, G., Singh, G., Tuli, N., & Mantri, A. (2024). Hyperspace AR: an augmented reality application to enhance spatial skills and conceptual knowledge of students in trigonometry. *Multimedia Tools and Applications*, 83(21), 60881–60902. <https://doi.org/10.1007/s11042-023-17870-w>
- Suryadi, D., Gustian, U., & Fauziah, E. (2022). The Somatotype of Martial Athletes in the Fighter Category Against Achievement. *JUARA: Jurnal Olahraga*, 7(1), 116–125. <https://doi.org/10.33222/juara.v7i1.1484>
- Suryadi, D., & Rubiyatno. (2022). Kebugaran jasmani pada siswa yang mengikuti ekstrakurikuler futsal. *Jurnal Ilmu Keolahragaan*, 5(1), 1–8. <https://doi.org/10.26418/jilo.v5i1.51718>
- Tanri, A., Aprial, M. B., Mashud, M., Kristyandaru, A., Kahri, M., Basuki, S., Samodra, Y. T. J., Warni, H., Arifin, S., Puspita Wati, I. D., Thamrin, L., & Suryadi, D. (2023). Modificación de multimedia interactivo con el ARA MODELO: estudio del desarrollo de modelos de aprendizaje del fútbol en tiempos de pandemia (Modification of interactive multimedia with the ARA MODEL: study of development of football learning models in pa. *Retos*, 50(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 1289–1298. <https://doi.org/10.47197/retos.v50.100587>
- Vieyra, G. Q., & González, L. F. M. (2020). Learning Objects in Online Education: A Systemic Approach. *European Journal of Education*, 3(2), 142. <https://doi.org/10.26417/997kdf24o>
- Yuan, B., Kamruzzaman, M. M., & Shan, S. (2021). Application of Motion Sensor Based on Neural Network in Basketball Technology and Physical Fitness Evaluation System. *Wireless Communications and Mobile Computing*, Article ID 5562954, 11 pages. <https://doi.org/10.1155/2021/5562954>
- Yusroni, M. (2024). Game model to improve motor skills through traditional sports: Development study on elementary school students. *Tanjungpura Journal of Coaching Research*, 2(2), 71–79. <https://doi.org/10.26418/tajor.v2i2.79872>
- Zeng, Q. (2020). Research on Multimedia Swimming Teaching under Informatization. *Proceedings - 2020 International Conference on Computers, Information Processing and Advanced Education, CIPAE 2020*, 60–63. <https://doi.org/10.1109/CIPAE51077.2020.00023>