



Development of front and back rolling mobile learning media for class x students of SMAN 1 Pamekasan

Dwi Akbar Fitriliyanto¹, Usman Wahyudi^{2*}, Rama Kurniawan³

^{1,2,3} Universitas Negeri Malang, Jl. Semarang No 5, Malang City, East Java Province, Indonesia

E-mail: usman.wahyudi.fik@um.ac.id

Received: 24 September 2022

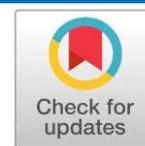
Accepted: 19 November 2022

Published: 20 December 2022

Abstract: Many students do not understand the gymnastic movements being taught and become bored with the movement, as well as the learning method. This study aims to produce a learning media device in physical education, sports and health in the form of mobile learning floor exercise with front roll and back roll material for student's class X of SMAN 1 Pamekasan so that it can be a teaching material. In this study, the Research and Development (R&D) from Lee and Owens was used. So that only 5 steps are in accordance with the conditions in the field. (1) needs analysis, (2) product design, (3) development related to the material to be developed (4) application/implementation, (5) product evaluation by experts and product trials. Results of product development data obtained the first result (91.3%) with 32 students and the second group (87.4%) with 115 students. From the results of these data, it can be concluded that the criteria for learning media products for floor exercise materials based on mobile learning have very valid criteria and are suitable for use in learning activities in schools.

Keywords: mobile learning; learning media; gymnastic.

How to cite: Fitriliyanto, D. A., Wahyudi, U., & Kurniawan, R. (2022). Development of front and back rolling mobile learning media for class x students of SMAN 1 Pamekasan. *Journal of Science and Education (JSE)*, 3(2): 184-195. <https://doi.org/10.56003/jse.v3i2.171>



INTRODUCTION

In the current era of technology and information is developing very rapidly. These developments lead to changes in lifestyle, way of thinking, training systems, and other sides. As a result of this, the generation born in 1995-2010 is usually called Generation Z. According to Subandowo (2017) Generation Z is called the Net Generation, iGeneration, or Internet Generation, who were born in 1995-2010. When the rapid development of IT, the net generation or generation z was born. So that this generation is fluent in technology, interacts intensely on social media, multitasking, fast switcher, also likes to share (Wijoyo, 2020). Currently, most elementary or advanced school students are generation Z. With the Z generation, learning methods are required to experience development and innovation by using more modern media learning, in order to create a more active and effective learning atmosphere.

One of the subjects included in the national curriculum is physical education, sports and health. According to the Ministry of National Education 2006, Physical Education is a subject that is taught at certain school levels and overall, that prioritizes physical activity and fostering healthy living for growth and physical activity. In the assessment there are several aspects, the first is cognitive, the second is affective, and the third is psychomotor. Cognitive in the form of knowledge or intelligence of children, affective in the form of attitudes, or behaviour, and psychomotor movement skills.



The curriculum is a guide for learning activities that discuss plans and arrangements regarding the content, objectives, and learning materials to achieve predetermined educational goals. Permendikbud No. 68 of 2013, explains, "that the 2013 curriculum aims to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative, and affective and able to contribute to the life of society, nation, state, and civilization. world". Floor gymnastics is a learning material in the 2013 curriculum.

Floor gymnastics exercises are teaching materials that are taught in physical education subjects ranging from elementary school to high school. In KD 4.6 for SMA it reads "practicing the results of simple series of motion analysis in specific floor gymnastics activities". The material is delivered through concepts and learning practices, so that students are expected to be able to master a series of different basic movements according to the material being taught and will later be analysed together. According to [Muhajir \(2006\)](#), gymnastics is a body exercise activity on the floor or equipment that aims to increase immunity, endurance and flexibility of the body, and self-control. Gymnastics is an important activity to improve physical and movement abilities, this was conveyed by [Muhajir \(2006\)](#). The front roll and back roll movements, including floor gymnastics lessons, are carried out on the floor using a mat to develop the ability to perform various types of floor gymnastics.

To create a more active and effective learning atmosphere, it is necessary to use learning media. By using the media as learning can help how to learn and teach ([Ahmad, 2009](#)). It can be concluded that the provision of good learning services to students is able to bring up intrinsic motivation in children ([Kurniawan, et al., 2021](#)). In the same presentation, it can be said that learning media has an important role in every teaching and learning process. The use of media during a well-prepared learning process can be quite easy for students to follow and understand the material ([Muhson, 2010](#)). Learning media must meet several principles, be interesting, easy to see, useful/useful, simple, true/accountable, reasonable/legitimate, and well-structured in planning for media use ([Nursetya & Kriswanto, 2014](#)). The use of media applications is expected to increase student interest in learning.

Application media can be in the form of animations or videos that are more interesting than images or print media, this is supported through ([Arya et al., 2016](#)) previous research regarding the use of media in this case involving technology can increase the effectiveness of the learning process. Therefore, by using application media in learning, it is hoped that the movement learning process can be maximized. The advantage of using technology-based learning media is that it is hoped that later students will be able to understand the material presented, because by using technology-based learning media, students can slow down the movement so that they understand well the steps in doing these gymnastic movements. Students can also repeat examples of movements until they really understand so as to avoid mistakes in the learning process. Learning media can also make it easier for teachers to give directions regarding learning materials.

The learning time can also be shorter because the application media determines the playback time of the motion video.

At this time many teachers have used mobile learning in the teaching process. Mobile Learning is a learning media device that can be used by educators to provide lessons to students using electronic media, such as Laptops, Tablet PCs, Smartphones. Mobile learning media allows students to easily get teaching materials, according to the direction of the teacher. One of the advantages of mobile learning is that it can be accessed anywhere and there is limited time during the learning process. [Nealbert et al. \(2014\)](#) also states that one advantage of using mobile learning-based teaching materials is the ease of getting information anywhere and at an unspecified time. This agrees with [Purbosari \(2017\)](#) statement that one option to give students time to study independently is by using mobile learning. Media development using autoplay media studio on floor gymnastics is able to increase students' interest, motivation and interest in learning, then help teachers in adding teaching material references ([Kurniawan et al., 2022](#)). So, it is hoped that the use of media in the teaching and learning process of physical education material, especially on floor exercise material, can be more effective in terms of increasing student understanding.

Previous research conducted by [Kurniawan, et al., \(2022\)](#) stated that the presence of interactive media in learning floor gymnastics can improve students' understanding and help teachers as additional teaching materials in schools. Based on observations and interviews conducted during physical education lessons to teachers and students at SMAN 1 Pamekasan, it can be said that most students consider the forward roll and back roll movements difficult. In addition, the interest of students to study in books has decreased, especially physical education subjects, they are more interested in technology-based learning. Floor gymnastics learning that is carried out through theory and practice is expected to be more easily accepted and implemented by students, but in reality, students tend to follow the teacher's orders with a conventional learning model, namely by exemplifying the movement and then asking students to do the movement in turn. This causes students to get bored and wait a long time for their turn ([Mukhlis et al., 2020](#)). According to [Ahmad \(2009\)](#) the process of exemplifying the movement sometimes some students cannot catch the movement material properly because the movement is too fast or because the conditions are not conducive, so many students cannot understand well the gymnastic movements being taught and tend to get bored with the movement, the learning method, And not all teachers are able to give examples of forward and backward roll movements perfectly due to the age factor. Media development using autoplay media studio on floor gymnastics is able to increase students' interest, motivation and interest in learning, then help teachers in adding teaching material references ([Kurniawan et al., 2022](#)).

To strengthen the observations, the researchers distributed questionnaires to students at SMAN 1 Pamekasan. The number of questionnaires distributed was 34 for students and one questionnaire for physical education teachers. From filling out the questionnaire, the following results were obtained. The results obtained (73%) of students stated that learning the front roll and back roll movements was difficult to do,

(70%) students stated that it was very necessary to have learning application media in the form of videos of the front roll and back roll exercise models, (67%) students often used mobile phones to help the learning process, (100%) students agreed to use mobile learning application media. The results of the questionnaire addressed to one physical education teacher were obtained (100%) the teacher gave floor exercise material every year, (100%) the teacher had never used the Mobile learning application, (100%) the teacher by using the application could facilitate the delivery of material, and (100 %) stated that the teacher agreed with the mobile learning application media for front roll and back roll for floor exercise material. So, the researcher decided to conduct this research.

METHOD

This study used the Research and Development (R&D) method from Lee and Owens. So that only 5 steps are in accordance with the conditions in the field. (1) analyzing needs, (2) product design, (3) developing media, (4) implementing, (5) evaluating a product. The procedure is used to solve problems that exist in the field, so as to create a product. This series of research processes is used in order to be able to compile and create mobile learning media products, especially the front and back roll floor exercises.

The procedures for developing front and back roll learning mobile learning media are: (1) the initial step, conducting observations, interviews with teachers, and distributing questionnaires. (2) Product design, in the form of material contained in multimedia. (3) Development of the initial product form in the form of a mobile learning application product design. (4) the implementation or application of this product is carried out with expert validation. If the product is said to be feasible by the experts, then it is tested in small groups and large groups. (5) Product evaluation aims at the feasibility of a media developed through several expert validations, and small group trials of 32 students, as well as 115 large group students. The cauldron and quantity data are taken in this process. Assessments from experts and needs analysis questionnaires will later become qualitative data, for quantitative data obtained through group test results, both small groups and large groups. The data processing technique used in the development of front and back roll mobile learning media for class X students of SMAN 1 Pamekasan uses a Likert scale. To make the conclusions reached, the percentage classification is determined as in the following table:

Table 2. Clasification percentage

No	Score	Information
1	80% - 100%	Very thorough, very valid, very effective, can be used without repair
2	61% - 80%	Complete enough, effective enough, valid enough to be used but needs minor improvements
3	41% - 60%	Less complete, less effective or less valid, needs major improvements, it is recommended not to use it
4	21% - 40%	Incomplete, ineffective, invalid, unusable
5	0% - 20%	Very incomplete, very ineffective, very invalid, very unusable

RESULTS AND DISCUSSION

The data described in this discussion includes data: firstly the results of the development of front and back roll mobile learning products, secondly validation of a media expert, third validation of a learning expert, fourth validation of a floor gymnastics expert, five small group trials, six large group trials.

A. Result Product Development of Front and Back Rolling Mobile Learning

Development of Front and Back Rolling Mobile Learning Products Development products are packaged in the form of mobile learning applications and can be accessed via smartphones. In the application there are several menus, namely, understanding floor exercises, history of floor exercises, KI/KD, front and back roll videos, how to help front and back rolls, author bio and quizzes. Initial view of the application Main Menu Display.



Figure 1. Results of the Development of Front and Back Rolling Mobile Learning Products.

B. Validation

Data processing was obtained from 1 media expert who assessed aspects of suitability, accuracy, convenience, clarity, and effectiveness:

Table 3. Media expert analysis data

No	Aspect	Percentage	Category
1	Accuracy	96%	Very Valid
2	Attractiveness	100%	Very Valid
3	Suitability	100%	Very Valid
	Average	98,6	Very Valid

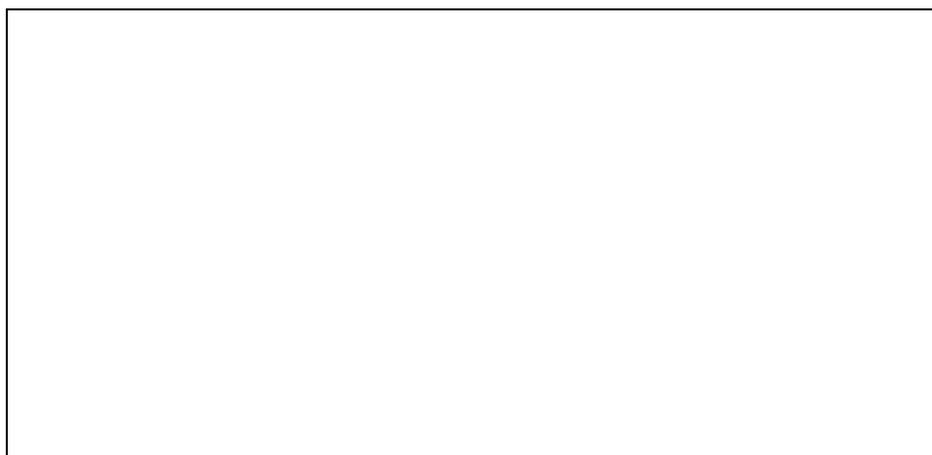


Figure 2. Percentage diagram of media expert assessments on learning media

The amount of the results of the analysis of media experts is 98.6%. This is obtained from various aspects which are then converted to several levels of Appropriateness so that it can be concluded that the product development has met the criteria for being very effective and is also feasible to use. However, there are some suggestions and inputs submitted, namely adding learning objectives or KI/KD.

C. Validation of Learning Experts

Processing data from 1 learning expert in the form of Aspect Accuracy, Ease, Effectiveness, Clarity, and Suitability.

Table 4. Data from the analysis of learning experts

No	Aspect	Percentage	Category
1	Accuracy	87%	Very Valid
2	Convenience	100%	Very Valid
3	Effectiveness	100%	Very Valid
4	Clarity	100%	Very Valid
5	Suitability	93%	Very Valid
	Average	96%	Very Valid

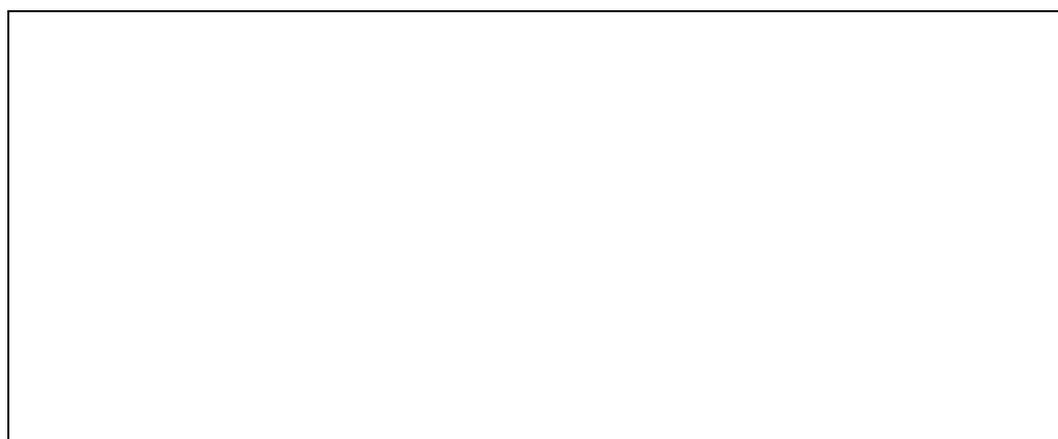


Figure 3. Diagram of the percentage of learning expert assessments

The magnitude of the results of the analysis of learning experts is 96%. This is obtained from various aspects which are then converted to several levels of Appropriateness so that it can be concluded that the

product development has met the criteria for being very effective and is also feasible to use. However, there are some suggestions and inputs submitted, namely adding learning KI/KD.

D. Validation of Gymnastics Experts

Data processing was obtained from 1 floor exercise expert who assessed Suitability, Accuracy, attractiveness, and Clarity.

Table 5. Data from the analysis of floor gymnastics experts

No	Aspect	Percentage	Category
1	Suitability	91,6%	Very Valid
2	Accuracy	91,6%	Very Valid
3	Attractiveness	87,5%	Very Valid
4	Clarity	91,6%	Very Valid
Average		90%	Very Valid

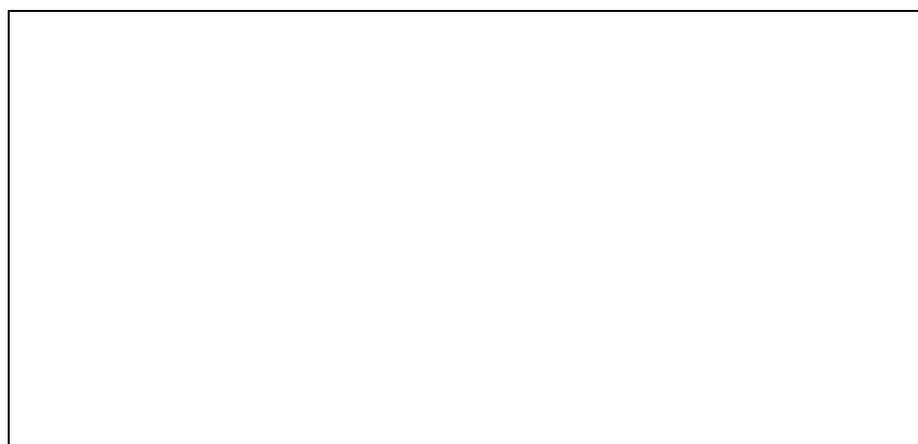


Figure 4. Diagram of the percentage of floor gymnastics expert assessments.

The result of the gymnastics expert's analysis is 90%. This is obtained from various aspects which are then converted to several levels of Appropriateness so that it can be concluded that the product development has met the criteria for being very effective and is also feasible to use. However, there were several suggestions and inputs, namely that each floor exercise material was given stages before doing the core movements, using a better mattress, and dubbing videos or verbal explanations.

E. Small group trial

Data obtained from 32 students and aspects include Accuracy, Convenience, Attractiveness, Clarity, and Suitability.

Table 6. Small group trial

No	Aspect	Percentage	Category
1	Accuracy	90,2%	Very Valid
2	Convenience	95,6%	Very Valid
3	Attractiveness	90,6%	Very Valid
4	Clarity	91,4%	Very Valid
5	Suitability	89%	Very Valid
Average		91,3%	Very Valid



Figure 5. Diagram of the percentage of small group trial results

The results of the small group test get a percentage of 91.3%. With a fairly high Average result from the specified Aspect, it can be concluded that the product has met the very valid criteria and is suitable for use.

F. Large Group Test

Data obtained from 115 students and Aspects include Accuracy, Convenience, Attractiveness, Clarity, and Suitability.

Table 7. Large group test result data

No	Aspect	Appropriateness	Category
1	Accuracy	89,1%	Very Valid
2	Convenience	88,4%	Very Valid
3	Attractiveness	85,1%	Very Valid
4	Clarity	84,6%	Very Valid
5	Suitability	90,2%	Very Valid
	Average	87,4%	Very Valid



Figure 6. Diagram of the percentage of large group trial

The average percentage is 87.4%. With most of the Aspects getting a fairly valid classification, it can be concluded that the product has met the criteria for use. The use of books in the learning process tends to

make students bored because they are only in the form of words and sentences, therefore it takes the help of other learning media in order to foster an interest in reading students, this agrees with ([Christianto & Dwiyoogo, 2020](#)) that is by using multimedia can make activities easier reading. With the learning media, it is hoped that it can foster a child's desire to learn in physical education subjects. The statement conveyed by ([Kurniawan, et al., 2021](#)) stated that the use of online media makes lessons more innovative, active, creative and not bored. This media can also be a source of new teaching materials for teachers to make lessons more efficient and effective ([Kurniawan, et al., 2022](#); [Kurniawan, et al., 2022](#); [Kurniawan, et al., 2022](#)). Opinions [Hidayah et al. \(2018\)](#) multimedia can also be a tool or means for students to understand the material taught by the teacher. According to [Supriyono \(2018\)](#) by using interesting multimedia, students' willingness to learn increases. The use of interactive multimedia as a tool can help students and make it easier to understand floor exercise material ([Wijayanto et al., 2020](#)).

This product will be in the form of mobile learning about floor exercise which includes text, images, music, and videos. The use of mobile learning can make students overcome the problem of lack of time and place to study ([Adi & Fathoni, 2020](#)). According to [Darmawan \(2013\)](#) mobile learning is a medium that can be accessed anywhere. This was also conveyed by [Kim et al. \(2013\)](#) that mobile learning can also be used by teachers to provide learning materials anywhere and anytime. So mobile learning media can be a breakthrough in the world of education for teachers to use in delivering material to students using electronic media such as laptops, tablet PCs, and smartphones that can be implemented anytime and anywhere. This smartphone will later be used to support students' lessons to obtain various desired information ([Albó et al., 2019](#)).

One of the studies conducted by [Pamungkas & Dwiyoogo \(2020\)](#) proves that the use of multimedia in physical fitness activities for class X SMK with a mobile learning model, in this case involving technology, can increase the effectiveness of the learning process. As revealed by [Amiq & Angga \(2021\)](#) mobile learning about futsal refereeing can improve students' understanding. Other findings also show that the use of forward and backward rolling motion media, especially in gymnastics learning, is more effective in increasing students' understanding, so that it can attract interest or motivation to learn ([Kurniawan & Hasan, 2021](#)). Some of the advantages of mobile learning according to [Junita \(2019\)](#) are that it can be accessed at any time, the price of the device is affordable compared to a PC, it can be taken anywhere, and it is light, can-do learning over long distances, can increase interaction between students and teachers, and the material can be updated. So, the researcher wants to use the multimedia floor exercise application to learn these movements more optimally. The advantages of using technology-based learning media are expected to be able to ease students' understanding of floor exercise material, because by using technology-based learning media, students can repeat the movements so that they understand well the steps in doing the gymnastics movements. Learning media can also make it easier for teachers to give directions regarding

learning materials. The learning time can also be shorter because the application media determines the time for playing the motion video and the delivery of the material to be delivered.

The results of the front and back roll learning mobile learning media products have several advantages, this was found after expert validation tests and trials were carried out several times for revisions, the first product was in the form of an app containing front and back roll material. Second Contains teaching materials in the form of front and back roll videos. The three front and rear roll products are based on mobile learning that can be installed on smartphones. These four products can be used by students and teachers as a learning tool.

This media only has front and back roll movements for class X in the form of a mobile learning application using a smartphone. In the application there are several menus, namely, understanding floor exercise, history of floor exercise, KI/KD, front and back roll videos, how to help front roll, back roll, author bio and quizzes. Later this product can be used as teaching material in the classroom to provide explanations about floor exercise material in learning activities in the field. The development of this product in floor exercise learning is expected to be more modern and varied in order to motivate and interest students and also increase teacher knowledge about the field of technology which will later be quite useful for the teaching and learning process of physical education, especially floor exercise subjects, especially front and back roll learning.

CONCLUSION

Based on the description above, it can be concluded that the development of multimedia learning media for mobile learning front and back rolls for class X students of SMAN 1 Pamekasan is able to provide understanding to students about floor exercise material. This is obtained from the assessment of students to the media that will be used. Furthermore, the development of mobile learning learning media for front and back rolls can be used for physical education learning at the X grade high school level. It is hoped that this product can make it easier for teachers to deliver up-to-date material to students. Some of the advantages of mobile learning are that it can be accessed at any time, the price of the device is affordable compared to a PC, it can be carried anywhere, and it is light, and its can-do long-distance learning, it can increase the interaction between students and teachers, and the material can be updated. However, this product can only be installed on Android smartphone devices. The material is limited to the front and back roll floor exercises. Its use must be connected to the internet.

REFERENCES

- Adi, S., & Fathoni, A. F. (2020). Mobile Learning sebagai Fasilitas Belajar Mandiri Pembelajaran Senam Lantai pada Mahasiswa Jurusan Ilmu Keolahragaan. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 5(8), 1158. <https://doi.org/10.17977/jptpp.v5i8.13946>
- Ahmad, A. (2009). *Media Pembelajaran*. PT. Rajawali pers.

- Albó, L., Hernández-Leo, D., & Moreno Oliver, V. (2019). Smartphones or laptops in the collaborative classroom? A study of video-based learning in higher education. *Behaviour and Information Technology*, 38(6), 637–649. <https://doi.org/10.1080/0144929X.2018.1549596>
- Amiq, F., & Angga, D. (2021). Gelanggang Pendidikan Jasmani Indonesia Pengembangan Pembelajaran Sinyal-Sinyal Perwasitan Futsal Berbasis Mobile Learning. In *Gelanggang Pendidikan Jasmani Indonesia* (Vol. 5, Issue 1).
- Arya, P., Christ, T., & Chiu, M. M. (2016). Video use in teacher education: a survey of teacher-educators' practices across disciplines. *Journal of Computing in Higher Education*, 28(2), 261–300. <https://doi.org/10.1007/s12528-016-9116-y>
- Christianto, J., & Dwiyo, W. D. (2020). Pengembangan Media Pembelajaran Cricket Berbasis Mobile Learning Pada Tim Olahraga Cricket Universitas Negeri Malang. *Gelanggang Pendidikan Jasmani Indonesia*, 3(2), 168. <https://doi.org/10.17977/um040v3i2p168-174>
- Darmawan, D. (2013). *Teknologi Pembelajaran*. Remaja Rosdakarya.
- Hidayah, P., Untari, M. F. A., & Wardana, M. Y. S. (2018). Pengembangan Media Sepeda (Sistem Peredaran Darah) dalam Pembelajaran IPA di Sekolah Dasar. *International Journal of Elementary Education*, 2(4), 306. <https://doi.org/10.23887/ijee.v2i4.16109>
- Junita, W. (2019). Penggunaan mobile learning sebagai media dalam pembelajaran. *Prosiding Seminar Nasional Teknologi Pendidikan Pascasarjana UNIMED*, 602–609.
- Kim, D., Rueckert, D., Kim, D., & Seo, D. (2013). STUDENTS' PERCEPTIONS AND EXPERIENCES OF MOBILE LEARNING. *Language Learning & Technology*, 17(3), 52–73.
- Kurniawan, A. W., & Hasan, A. N. H. (2021). Survei Efektifitas Proses Pembelajaran Online Akibat Pandemi Coronavirus (Covid-19) Pada Mata Kuliah Senam Lantai. *Journal Coaching Education Sports*, 2(2), 177–194. <https://doi.org/10.31599/jces.v2i2.726>
- Kurniawan, A. W., Surya, K. K. H., & Kurniawan, R. (2022). Pengembangan Media Pembelajaran Aktivitas Kebugaran Jasmani Unsur Kelentukan Berbasis Multimedia Interaktif di Sekolah Menengah Pertama. *Jurnal Patriot*, 4(1), 25–35. <https://doi.org/10.24036/patriot.v4i1.831>
- Kurniawan, R., Aji Pradana, I., & Paulina Heynoek, F. (2022). Pengembangan modul guru materi variasi dan kombinasi gerak lokomotor non-lokomotor manipulatif untuk siswa autis. *Multilateral: Jurnal Pendidikan Jasmani Dan Olahraga*, 21(2), 98–114. <https://doi.org/10.20527/MULTILATERAL.V21I2.13161>
- Kurniawan, R., Heynoek, F. P., & Wijaya, M. A. I. (2021). Pengembangan Modul Guru pada Pembelajaran Materi Gerak Dasar Locomotor Kelas II SDLB Autis. *Jurnal Patriot*, 4(3), 71–81. <https://doi.org/10.24036/patriot.v>
- Kurniawan, R., Mu'arifin, Kurniawan, A. W., Heynoek, F. P., & Sigit, C. N. (2022). Development of Teacher E-Module for Dynamic Balance Movement for Grade 3 Elementary School with Autism. *Proceedings of the 5th International Conference on Sport Science and Health (ICSSH 2021)*, 45, 98–103. <https://doi.org/10.2991/AHSR.K.220203.015>
- Kurniawan, R., Pambudi, S., & Heynoek, F. P. (2022). Development of Teacher Guidelines on Non- Locomotor Movement Learning for Student with Autism. *Jurnal Pendidikan Jasmani Indonesia*, 18(1), 57–68. <https://doi.org/10.21831/JPJI.V18I1.48626>
- Kurniawan, R., Paulina Heynoek, F., & Winda Wijayanti, A. (2022). Pengembangan Modul Guru Pada Materi Variasi dan Kombinasi Gerak Locomotor dan Manipulatif untuk SMALB. *Physical Activity Journal (PAJU)*, 3(2), 141–160. <https://doi.org/10.20884/1.PAJU.2022.3.2.5480>
- Kurniawan, R., Wibowo, A., & Wijaya, D. (2021). Analysis of internal and external factors. *Jurnal Sport Area*, 6(3), 385–393.

- Muhajir. (2006). *Pendidikan Jasmani Olahraga dan Kesehatan Untuk 1 SMK*. Yudhistira.
- Muhson, A. (2010). Pengembangan Media Pembelajaran Berbasis Teknologi Informasi. *Jurnal Pendidikan Akuntansi Indonesia*, 8(2), 1–10.
- Mukhlis, N. A., Kurniawan, A. W., & Kurniawan, R. (2020). Pengembangan Media Kebugaran Jasmani Unsur Kekuatan Berbasis Multimedia Interaktif. *Sport Science and Health*, 2(11), 566–581. <https://doi.org/10.17977/um062v3i22021p40-53>
- Nealbert, J., Calimag, V., Miguel, A. G., Conde, R. S., & Aquino, L. B. (2014). Ubiquitous Learning Environment Using Android Mobile Application. *IMPACT: International Journal of Research in Engineering & Technology*, 2(2), 2321–8843.
- Nursetya, S. B., & Kriswanto, E. S. (2014). Upaya Meningkatkan Kedisiplinan Siswa Kelas X SMA Negeri 1 Wates Dalam Mengikuti Pembelajaran Penjasorkes Melalui Reinforcement (Penguatan). *Jurnal Pendidikan Jasmani Indonesia*, 10(2), 8–12.
- Pamungkas, I. A., & Dwiyoogo, W. D. (2020). Pengembangan Media Pembelajaran Berbasis Mobile Learning Untuk Aktifitas Kesegaran Jasmani Siswa kelas X Sekolah Menengah Kejuruhan. *Sport Science and Health*, 2(5).
- Purbosari, H. B. (2017). Aplikasi Android Sebagai Pembantu Tugas Guru Di Kelas. *Seminar Nasional Pendidikan (SENDIKA)*, November, 18–21.
- Subandowo, A. M. (2017). Peradaban dan Produktivitas dalam Perspektif Bonus Demografi serta Generasi Y dan Z. *SOSIOHUMANIKA: Jurnal Pendidikan Sains Sosial Dan Kemanusiaan*, 10(2).
- Supriyono. (2018). Pentingnya Media Pembelajaran Untuk Meningkatkan Minat Belajar Siswa Sd. *Jurnal Pendidikan Dasar*, 2, 43–48.
- Wijayanto, A., Yunis, S., Kurniawan, A. W., Rahadian, A., Amiq, F., & Ika, A. (2020). *eBook B Strategi Pembelajaran PJKR selama Covid19*. Akademia Pustaka.
- Wijoyo. (2020). *Generasi z & revolusi industri 4.0*. Pena Persada.