Development of Swimming Learning Media Based on Interactive Multimedia Applications Through Computers and Smartphones

Satrio Jaya Susena[✉], Sugiharto Sugiharto, Donny Wira Yudha Kusuma

Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	Swimming is a water sport that involves movement abilities in the water; yet, the lack of swimming learning media that encourages movement impedes the swimming learning process. This study developed learning media based on interactive multimedia applications that can be accessed via computers and smartphones in conjunction with swimming lessons, as well as to determine and analyze the effectiveness of using interactive multimedia applications under swimming lessons. Development research or educational research and development was the research design. The research subjects and locations are health and sport education students and teachers at private universities in the Kuningan and Cirebon areas. The research resulted in the development of swimming learning media products based on interactive multimedia applications named PRM Mobile Swimming Learning. These products can be accessed via computers and smartphones and are used to assist in the process of swimming learning. Student assessments of the display quality and supporting features (attractiveness and convenience) show that the development of swimming learning media based on interactive multimedia apps is of "Very Good" quality, scoring 87%. While student assessments of material quality and content in swimming learning (utility) indicated that the development of swimming learning media based on interactive multimedia apps was "Very Good" in quality 84%.

[✉] Correspondence address:
Kampus Pascasarjana UNNES Jl. Kelud Utara 3,Gajahmungkur
Semarang
E-mail: Riyojs66@gmail.com

INTRODUCTION

Swimming is one of the water sports that require proficiency in following rules and a decent, effective, and efficient swimming style (Solihin & Sriningsih, 2016:28). This is implemented to maintain that effective and efficient movements enhance speed, resulting in a good time record till the finish. Swimming is taught as one of the lecture materials at a variety of institutions, physical education study programs, and health and sports programs (Royana, 2015). Swimming is an anaerobic exercise that can help you enhance your physical fitness (Magno & Mascardo, 2009).

Swimming is any activity which requires action in water, such as walking or playing. Swimming provides a novel, enjoyable experience, as well as a sense of well-being, as you make new friends, compete, and feel successful (Fernando et al., 2018). The swimming challenge necessitates the ability to swim, namely mastering how to breathe in water. How to breathe properly and correctly is accomplished by breathing air through the mouth and blowing beneath the surface of the water with the mouth. Then comes the ability to float on the water's surface and the capability to swim in a variety of styles (David Haller, 2007).

Swimming is any action that takes place in water, such as strolling or playing. Swimming provides a new, enjoyable experience, as well as a sense of well-being, as you meet new people, compete, and feel successful (Fernando et al., 2018). Swimming is a water sport that involves the performance of specific movements or styles such as the butterfly, backstroke, breaststroke, and freestyle. The breaststroke is the slowest of the four swimming types; judging by the swimming rate, the breaststroke is often slower (Priana, 2019).

The educational process is characterized by active communication interactions between students and teachers or between students and lecturers throughout educational activities.

There are two types of learning activities in the learning process: those carried out by students/students and those carried out by teachers/lecturers. Both types of activities take place interactively, resulting in active communication interactions (Suprihatiningrum, 2013:81). During lectures, there is a component to the swimming learning process that supports students' swimming ability (Susanto, 2010). These components include mastery of swimming style, comprehension of swimming learning theory, and understanding of how to implement a method when presenting a swimming lesson (Penggalih et al., 2019).

Swimming learning can be optimized using a variety of supports; these supports act as a medium that can assist in the process of learning, regardless of how flawless the process is (Susanto, 2013). Effective learning is the application of appropriate learning methods and media to the subject being delivered to students by an instructor. One of them is the use of computers as learning media via multimedia learning (Sukiyandari & Soegiyanto, 2014).

The development of technology at this time has resulted in a rapid increase in the use of learning media in the technological world. This is evident in daily activities, which are primarily employed for learning via devices, games, and social media (Tafonao, 2018). During this pandemic, lecturers and students must be expected to follow and experience technology developments in order for learning to become more innovative and distance learning to be optimized. "The use of computers in conjunction with innovative technology, including multimedia and the internet, enables lecturers and students to take advantage of a plethora of options and instill a new sense of purpose in learning." (Suminto, 2012: 56) in (El-Sofany et al., 2014).

Computer- and smartphone-based learning media can generate a passionate response from students (Susanto, 2010). The media displays an image, video that is summarized into a single unit in the software

(Mishra & Sharma, 2005). Android is a mobile operating system (Mardian et al., 2019). A smartphone operating system capable of running all applications (Royana, 2015). In other words, if learning media are incorporated in application software, they become more accessible throughout the learning process, both in the classroom and on the field. At the time of learning to swim in a pool, prior students are asked to absorb the lecturer's material in advance by accessing a media application downloaded to their respective smartphones.

According to the findings of researchers who interviewed experts from the swimming subject lecturers via whatsapps telecommunication applications on Tuesday, June 16, 2020 at 21.00 WIB, the conclusion is 100 percent that there is no learning media that intends to assist students in learning. swimming, as well as distance education. Then 40% responded that lecturers of swimming theory and practice did not provide enough variance in exercise during the swimming learning process. This is demonstrated during breaststroke, freestyle, backstroke, and butterfly lessons.

Swimming recognizes 3 types of resistance: front resistance, water friction resistance, whirlpool resistance (Lekso, 2013). Swimming has 3 parts that must be considered. To begin, each swimming style has a unique foot movement. Only the breaststroke and the butterfly have distinct arm movements. Freestyle and backstroke are identical, but their arm movements are reversed. The three parts of coordination are footwork, arm movement, and breathing (David Haller, 2007:16).

The obstacle to delivering swimming style material is that lecturers do not provide videos of good swimming style moving pictures, and lecturers only provide learning resources as swimming learning books. Many students conduct stiff leg movements in each of the four swimming styles, which results in many students feeling unable to coordinate their movements with their arms, and it takes a long time to master the swimming technique. Efforts can be made by expanding the variety of exercises and by learning media that show proper swimming technique motions and clear swimming content, followed by directions on how to perform it starting with leg, arm, floating, gliding, and arm, leg coordination, and breathing.

Android is an open (open source) operating system based on Linux that is optimized for touch-screen mobile devices such as tablet computers and smart phones Sherif Salbino (dalam Alfarizi et al., 2020). Smartphones can be utilized for educational purposes in a variety of ways, one of which is by systematic packaging of material in an application. Commercial applications for smartphones can be programmed and downloaded on Playstore via an Internet connection. However, certain applications are designed to be rapidly transferred through Bluetooth, Share-it, or other non-commercial transfer media (Wicahyani et al., 2018). Android's success is owing to its transparency and flexibility of development, which allows for the creation of numerous applications, as stated by (Ma et al., 2014:188), "Now the Android system in the electronics market is becoming more and more popular, especially in the smartphone market. Because of the open source, some of the development tools are free, so there are plenty of applications generated". When Android was released for the first time on November 5, 2007, Android and the Open Handset Alliance stated that they supported open source development on mobile devices. On the other hand, Google distributes Android source code under the Apache license, a software license, and an open platform for mobile devices (Lu 'mu, 2017).

Technological advancements in the modern day compel researchers to include software as apps into their research. So that the windows operating system in the computer and the android operating system in the smartphone can be used to their full potential. The researchers used the title "Development of

Swimming Learning Media Using Interactive Multimedia Applications via Computers and Smartphones" for this reason. In other words, researchers can use this data to develop strategies for overcoming swimming style errors while learning to swim.

METHODS

This research is included in educational research and development (R and D) procedures. Educational research and development are conducted in stages. These stages are: (1) Product analysis, (2) Product development, (3) Expert Validation, (4) Field Trial, and (5) Product Revision. The product trial data source seeks to collect data that will be used to determine the product's quality and efficacy in assisting students. The data will be collected in line with the proper stages and swimming lessons. The data is used to summarize the quality of learning media based on the development of interactive multimedia applications, including their appearance, content, and accessibility via smartphones and computers, attendance percentage features, reading features to improve swimming style, and programming quality. The resulting product is a mobile application called "PRM" that can be downloaded from the Android Play Store and a webpage at prmpembelajaranrenangmobile.com. There is a menu in the program that provides the contents of the stages of swimming learning material. The "PRM" application's menu are : (1) Materials, (2) Attendance Features, (3) Swimming Definition and History, (4) Application account settings, (5) Swimming competition rules, and (6) Creator profile. Additionally, you may click (7) Log Out to exit the application. The seven menus are accessible through the student/student registration account. The following menus are available for lecturer/teacher accounts: (1) Student Data, (2) Assessment, (3) Attendance, and (4) Log out. The stages of swimming learning material are: (1) definition and history of swimming, (2) competition regulations for

swimming, (3) basic swimming techniques, (4) swimming style, and (5) swimming sports facilities and infrastructure. (6) swimming competition numbers, (7) The benefits of swimming and (8) Water games to get you started with swimming lessons.

The trial's subject is the intended audience for the product, namely students of physical education, health and recreation, and faculty of teaching and education. Trials on 15 students at the University of Nahdlatul Ulama Cirebon will be conducted on a small scale. Meanwhile, product testing on a broad scale will be done at two universities in East Java's Region III, namely the University of 17 August 1945 in Cirebon, with 12 students, and STKIP Muhammadiyah Kuningan, with 18 students. Based on the diversity of students at Nahdlatul Ulama Cirebon University, the University of 17 August 1945 Cirebon University, and STKIP Muhammadiyah Kuningan. As a result, the researchers adopted a technique known as total sampling. The quantitative data analysis technique used in this study is descriptive statistical analysis as very poor, deficient, modest, good, and very good statements that are converted to quantitative data using a five-point scale, specifically by scoring or assessing from 1 to 5. Among other things, data analysis: Collecting preliminary data, 2). Providing a grade / value, 3). Score / value obtained and 5). Converted to a numerical value using a five-point scale. (Suharyanto, 2007:52) in Suharyanto, (Royana, 2015) which is presented in the table below:

Table 1. Assessment criteria

Score	Value	Category
$X > 4.21$	A	Very good
$3.40 < X \leq 4.21$	B	Good
$2.60 < X \leq 3.40$	C	Modest
$1.79 < X \leq 2.60$	D	Deficient
$X \leq 1.79$	E	Very poor

Next to calculate the percentage use the formula below:

$$P(\%) \frac{f}{n} X100$$

Information : P = Presentation of the results of the test subjects

f = Subject frequency

n = Total number

To make a decision using the criteria set by (Sutrisno Hadi, 2004:25) in (Ibnu Fatkhu R, 2015:78). As follows:

Table 2. Assessment criteria to determine the percentage

Value	Scoring scale	Qualification
1	0 – 55	Very poor
2	56 – 65	Deficient
3	66 – 80	Good
4	81 – 100	Very good

RESULT AND DISCUSSION

Product description of developing swimming learning media based on interactive multimedia applications that can be accessed via computers and smartphones. The product for developing swimming learning media based on interactive multimedia applications is called "PRM" or Mobile Swimming Learning. This application contains materials contained in learning to swim in swimming theory and practice courses in college and videos that can help students practice swimming and stimulate the brain to follow the swimming style movements under the rules of swimming competitions.

The product developed by the researcher is a swimming learning media development based on interactive multimedia applications that can be accessed via computers and smartphones for students of the health and recreation physical education study program. The product is as an android application that can be downloaded in the play store with the keyword "PRM" and can be accessed through the website either on a computer or smartphone with the keyword prmpembelajaranrenangmobile.com Step by step is passed in making the application and the "PRM" website, namely the stages; 1). The first time that is determined is an idea that will be developed, by collecting information as a rationale for making a concept, 2). Develop from previous research products and make an initial draft / initial product stage 1, as a swimming learning media design model based on interactive multimedia applications, 3). Expert validation, expert validation was carried out by 4 experts, namely 2 swimming material experts and 2 media experts, 4). Evaluation, Initial product evaluation is carried out by the person concerned, 5). Initial product revision, revision is carried out by the relevant expert, 6). Initial Product Improvements, carried out by adding images, background designs in the application, and continued with the application of swimming videos on each material content of the products made, 7). Product trials, testing of field subjects both in small-scale trials and large-scale trials, 8). Phase II revision, revisions are carried out by experts in order to obtain good results, 9). The final product, product refinement to get to the final product that is expected from the development of swimming learning media based on interactive multimedia applications.

The first step is to build an idea, which is accomplished through amassing data, to serve as a basis for creating a concept. The results of observations and interviews are used to build a needs analysis. Among the conclusions drawn from this development are the following: 1). Swimming learning medium based on interactive multimedia applications as a substitute for modules, material books, and so on. 2). Swimming educational media based on interactive multimedia applications as an adjunct, supporting material as content, films, and features. 3) Swimming learning media based on interactive multimedia applications as a complement to the swimming learning process; 4) Swimming learning media

based on interactive multimedia applications as a tool, a tool for promoting cognitive science and stimulating psychomotor in swimming practice. The following stage is to validate the concept by creating an initial product or draft. The initial product is described as a set of swimming learning media contents in a book for creating application products that include application design display images. The initial product generated is expected to be structured in a systematic and logical manner, so that it can be developed and be beneficial for both the swimming learning process and the end product generated.

Prior to conducting small-scale and large-scale trials, the initial product (draft) is validated by experts. Two material experts and two media specialists were consulted by the researcher. Validation is accomplished by supplying an initial product along with an evaluation sheet for material and media experts. The assessment sheet is in the form of a questionnaire and contains questions regarding attractiveness, convenience, and usefulness indicators.

The following stage is to assess the initial product (draft). The scripts are evaluated by material experts and media professionals in order to develop and enhance them. The data collected through expert validation questionnaires serves as a guideline for determining if the generated product is feasible for the swimming learning process. The following stage is modification of the initial product; after amended with input from each expert, including material and media specialists, the initial product is validated and the final product is prepared for testing.

The following stage is a trial; this trial is used to identify flaws and then make adjustments, ideas, and evaluations of the product that are being developed. The study is implemented in steps, namely: 1). Developing a trial design, 2). Determining the test subject, developing data instruments, and establishing data analysis methodologies are the next steps. This phase of testing was conducted on both a small and large scale. This is a small-scale trial phase with only twenty pupils. For the large-scale experimental phase, 40 pupils were used. The goal of this experiment is to further the development of swimming learning media through the identification and refinement of interactive multimedia applications after they have been examined by experts.

Product Quality Trial Data for Swimming Course Lecturers

Three lecturers from three separate private institutions in Cirebon City and Kuningan Regency were subjected to trials on swimming course lecturers. After getting instructions from researchers regarding the benefits, how to use, and how to track student attendance and assessment via the "PRM" mobile swimming learning application, the trial was conducted with swimming course lecturers. Following the stage of using the application, the lecturer completes a questionnaire to ascertain and evaluate the product's importance after being used by many users. After the lecturer completed the questionnaire, the researcher and lecturer engaged in a question-and-answer session to elicit suggestions, criticisms, and improvements, as well as the lecturer's comments, regarding the development of swimming learning media based on interactive multimedia applications. The following table and figure illustrate the data collected via a questionnaire regarding the lecturer's trial:

Table 3. The results of product quality trials on swimming course lecturers

Rated aspect	Lecturer I	Lecturer II	Lecturer III
Material Quality	44	44	44
Display quality and supporting features	48	45	48
Total score	92	89	92
Mean	4.65	4.45	4.65
Percentage	92	89	92
Category	Very good	Very good	Very good

Data Analysis of Large Group Product Trial Results

The results of the large group trial provide information about the quality of developing swimming learning media based on interactive multimedia applications, including display quality and supporting features (attractiveness and convenience), as well as the quality of the material content used in learning (usefulness). This data indicates that students have an opinion about the quality of the developed application. Additionally, qualitative data as suggestions and improvements was gathered as material for product revision in order to produce swimming educational media based on interactive multimedia apps. Thirty students from the health and recreation physical education study program participated in this trial.

Student assessments of the display quality and supporting features (attractiveness and convenience) show that the development of swimming learning media based on interactive multimedia apps is of "Very Good" level, scoring an average of 4.35. The questionnaire assesses this element through the use of five statement items. While student evaluations of the material content used in learning (utility) show that the development of swimming learning media based on interactive multimedia apps is of "good" quality, scoring an average of 4.2. This component is likewise assessed through the use of five statement items in the questionnaire. The following table summarizes assessment results on display quality and supporting features (attractiveness and convenience), as well as the quality of material content in small group trial learning (usefulness):

Table 4. Product quality as a result of data analysis in large group trials

Assessment Aspect	Mean	Percentage of Each Aspect	Category
Display quality and supporting features (attractiveness and convenience)	4.35	87	Very good
Quality of material and content in learning (usefulness)	4.2	84	Very good
OVERALL AVERAGE	4.27		Very good

The results of the visual development of swimming learning media can be seen in Figure 1 to Figure 4.

And as follows, the name of the application in the play store "PRM" and the link for prmpembelajaranrenangmobile.com.
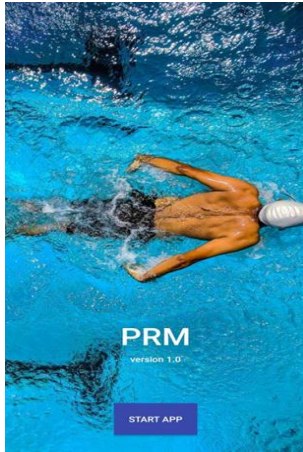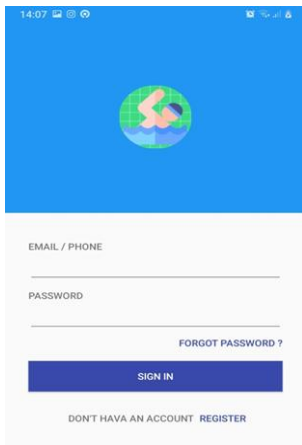
Figure 1. Initial view

Figure 2. Sigh In View All Users
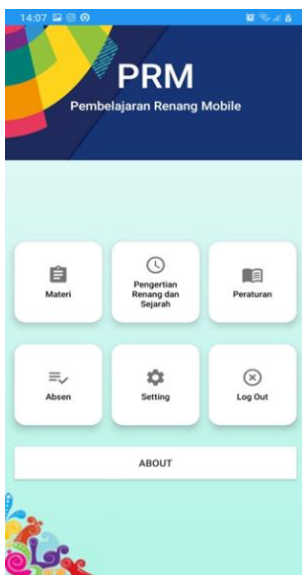

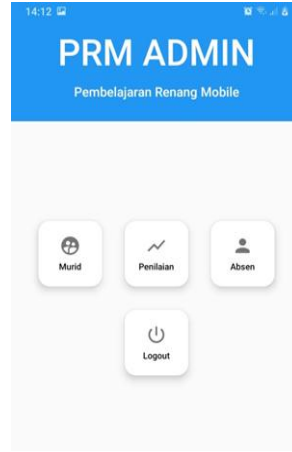**Figure 3**. Student User Dashboard Display

Figure 4. Lecturer/Teacher User Dashboard Display and Additional Features

CONCLUSION

According to the research findings, a swimming learning media product based on interactive multimedia applications may be accessed via smartphones and computers as an application and a web page. Students can access the application for free via Android, namely the play store, by searching for "PRM" Mobile Swimming Learning, or by visiting the website, specifically "prmpembelajaranrenangmobile.com."

Lecturers and students alike are enthusiastic about interactive multimedia-based learning media. The findings of a test of the effectiveness of small group products in assessing swimming practice during the learning process of swimming practice theory courses with a score of 70.55 percent on the "Good" scale. Evaluate the efficacy of large group products in assessing swimming practice during the learning process of swimming theory and practice courses, specifically using the 77 percent "Good" criteria. As a result, this application is feasible.

REFERENCE

Alfarizi, M. R., Sulaiman, & Rustiadi, T. (2020). *Android-Based Visual Audio in Training Single Category Pencak Silat Motion*. *9*(2), 143–149.

David Haller. (2007). *Belajar berenang*. Pionir Jaya Bandung.

El-Sofany, H. F., El-Seoud, S. A., Alwadani, H. M., & Alwadani, A. E. (2014). Development of mobile educational services application to improve educational outcomes using android technology. *International Journal of Interactive Mobile Technologies*, *8*(2), 4–9.

Fernando, H., Soegiyanto, & Kusuma, D. W. Y. (2018). Swimming Coached – Management Program of Indonesian Swimming Association in South Sumatera. *Journal of Physical Education and Sports*, *7*(1), 55–59.

Lekso, M. F. (2013). Pengaruh Metode Latihan Dan Power Tungkai Terhadap Kecepatan Renang Gaya Dada 50 Meter Atlet Kelompok Umur IV Perkumpulan Renang Spectrum Semarang. *Journal of Physical Education and Sports*, *2*(1), 2.

Lu 'mu. (2017). Learning Media Of Applications Design Based Android Mobile Smartphone. *International Journal of Applied Engineering Research*, *12*(17), 973–4562.

Ma, L., Gu, L., & Wang, J. (2014). Research and development of mobile application for android platform. *International Journal of Multimedia and Ubiquitous Engineering*, *9*(4), 187–198.

Magno, C., & Mascardo, E. (2009). The Effect of Rehearsal Learning and Warm-up on the Speed of Different Swimming Strokes. *The International Journal of Research and Review*, *2*, 46–56.

Mardian, R. D., Agoes, S., & S. Riffany, R. (2019). Perancangan Aplikasi Pelaporan Berbasis Android Pada Komunikasi Jaringan Data 4G. *Universitas Trisakti*.

Mishra, S., & Sharma, R. C. (2005). Interactive Multimedia in Education and Training. *Turkish Online Journal of Distance Education*, *6*(1), 115–122.

Penggalih, M. H. S. T., Dewinta, M. C. N., Solichah, K. M., Pratiwi, D., Niamilah, I., Nadila, A., Kusumawati, M. D., Siagian, C. M., & Asyulia, R. (2019). Anthropometric characteristics and dietery intake of swimming athletes with disabilities before the competition. *Jurnal Gizi Dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, *6*(1), 33.

Priana, A. (2019). Pengaruh Alat Bantu Latihan Pull Buoy Terhadap Prestasi Renang Gaya Dada. *Journal of SPORT (Sport, Physical Education, Organization, Recreation, and Training)*, *3*(1), 9–14.

Royana, I. F. (2015). *Pengembangan Multimedia Pembelajaran Renang Berbasis Android Pada Penjasorkes di SMA*. *1*(1), 878–882.

Solihin, O. A., & Sriningsih. (2016). *Pintar Bekajar Renang. Bandung*. Bandung : Alpfabeta.

Sukiyandari, L., & Soegiyanto. (2014). Pengembangan Multimedia Pembelajaran Materi Bola Voli Dalam Mata Pelajaran Penjasorkes Bagi Siswa Sma Se-Kabupaten Bantul Daerah Istimewa Yogyakarta. *Journal of Physical Education and Sports*, *3*(2).

Suprihatiningrum, J. (2013). *Strategi Pembelajaran Teori dan Aplikasi*. Yogyakarta: AR-RUZZ Media.

Susanto, E. (2010). Media Audiovisual Akuatik Untuk Meningkatkan Kualitas Pembelajaran. *Pedagogia Jurnal Penelitian Pendidikan*, *13*(1), 0–21.

Susanto, E. (2013). Pembelajaran Renang Gaya Bebas Dengan Pendekatan Gaya Mengajar Resiprokal. *Journal of Chemical Information and Modeling*, *53*(9), 1–17.

Tafonao, T. (2018). Peranan Media Pembelajaran Dalam Meningkatkan Minat Belajar Mahasiswa. *Jurnal Komunikasi Pendidikan*, *2*(2), 103.

Wicahyani, S., Handayani, O. W. K., & Hartono, M. (2018). Design android applications my mind mapping (M3) physical education, sport, & health subject curriculum 2013 for teachers guidance X th grade vocational high school. *Journal of Physical Education and Sports*, *7*(1), 73–82.