ORIGINAL ARTICLE

Integration of project based learning models with interactive multimedia: Innovative efforts to improve student breaststroke swimming skills

Mashud[1ABCDE], Syamsul Arifin[1ABCD], Advendi Kristiyandaru[2ABDE], Y Touvan Juni Samodra[3BCDE],
I Gusti Putu Ngurah Adi Santika[4BDE], Didi Suryadi[3,5ACDE]

[1] Departement Physical Education, Sport and Health, Universitas Lambung Mangkurat, Banjarmasin, Indonesia
[2] Departement Physical Education, Sport and Health, Universitas Negeri Surabaya, Surabaya, Indonesia
[3] Department of Sport Coaching Education, Faculty of Teacher Training and Education, Universitas Tanjungpura, Pontianak, Indonesia
[4] Department of Physical Education Health and Recreation, Faculty of Teacher Training and Education, Universitas PGRI Mahadewa, Bali, Indonesia
[5] Department of Sport Science, Faculty of Sport Science and Health, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

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Abstract

Background and Study Aim	Breaststroke swimming is one of the compulsory subjects for students majoring in sports education at Lambung Mangkurat University. Thus, it is important to have good breaststroke swimming skills so that later it will become the basis for creating experienced and potential teachers. Therefore, there is a need for special treatment to improve breaststroke swimming skills. This study aims to provide evidence of the integration of project based learning models with interactive multimedia on improving students' breaststroke swimming skills.
Material and Methods	This research is a quasi-experimental type with a pretest posttest non-equivalent control group design. The sampling technique used purposive sampling so that as many as 90 sports education students were sampled, namely 45 experimental groups and 45 control groups. The instrument resulting from breaststroke swimming skills was designed by the researcher, based on the theory of swimming experts, all descriptors for the breaststroke swimming instrument totalled 35 items. Furthermore, the analysis of the data in this study through the stages of normality test, homogeneity test, and hypothesis testing.
Results	The hypothesis test on the experimental group indicator with the PBL-Multimedia Interactive treatment showed a significance value of 0.000 <0.05 which means it is significant. Furthermore, the results on the control group indicator showed a significance value of 0.000 <0.05, so there was a significant increase. The results also show a difference with a significance of 0.001 <0.05, which means that the PBL- Multimedia Interactive experimental group and the control group (Conventional) have a significant difference in the effect on the posttest score.
Conclusions	This study shows that the PBL-Multimedia Interactive model integration treatment has a significant effect on improving students' breaststroke swimming skills. Where the integration of the PBL-Multimedia Interactive model is proven to be more effective than the conventional model. That way, the integration of the PBL-Multimedia Interactive model is effective and can be applied in swimming learning, especially in improving breaststroke swimming.
Keywords:	learning model, project based learning, interactive multimedia, swimming breaststroke

Introduction

Sport is a physical activity that can be carried out by various groups [1]. Along with its development, technological advances in sports coaching are needed [2]. Where technological advances are increasingly sophisticated and modern, so that they are very close to digital devices both online and offline [3]. Therefore, the rapid development of various technologies gives hope for the modernization of new technologies in the world

of education [4], including reforms in the world of sports [5]. In addition, models and media that are currently developing rapidly cause various demands and lifestyle changes, including sports, especially swimming [6].

Swimming is a sport that is done in water [7], and all levels of society can do this sport regardless of age and gender [8], and it is one of the most popular sports in the world [9]. Swimming activity is an important resource so as not to drown [10], besides that it also requires good and prime physical condition. Thus, physical fitness is also maintained [11, 12, 13, 14, 15], which is related to physical

health [16, 17, 18]. A study based on the results of clinical trials showed that swimmers found specific improvements in lung function [19]. The results of this review have provided an illustration that swimming is a very important water sport, both for physical abilities and health-related fitness. However, special attention is needed as said by Pharr et al that few studies have an understanding of predictors of swimming ability. There are various styles in swimming, one of which is the breaststroke [10].

Breaststroke swimming or what is often known as frog style is a swimming style facing the surface of the water, where the legs are moved outwards like kicking backwards. The movement starts from the first arm swing after sliding and the body must remain face down and both shoulders parallel to the surface of the water [20]. In addition, the breaststroke becomes the only competitive stroke [21], and the complex is also characterized by an intermittent propulsion phase [22]. A study by Strzała says that success in breaststroke swimming turns out that most of the power is reinforced by the kicking motion of the breaststroke and is considered the most responsible [23]. Therefore, it is very important to coordinate limb movements optimally for swimmers, this aims to maintain the best possible speed [21]. In addition, breaststroke swimming is a compulsory subject for students majoring in sports education at the Teaching and Education Faculty (FKIP) of Lambung Mangkurat University. Where the existence of swimming practice courses is the basis for the creation of experienced and potential teachers, thus providing an important role in the community environment.

Implementation of breaststroke swimming practice lectures to students by providing basic technical practice materials and swimming skills based on contracts and lecture teaching materials. Thus students are required to be able to do and practice breaststroke swimming, this is intended for preparation after graduating from university later. Therefore, to obtain maximum results, it is necessary to have a learning design so that it is not monotonous [24–28]. Where sports teachers are also a consideration in seeing student success [29]. Furthermore, harnessing the advancement of technology in a few decades may be an option to replace the traditional way [3]. The solutions offered use a project-based learning model with interactive multimedia, this is also considered in line with technological advances and their use in the world of sports. As is the case with what was said Jumaat & Tasir that sports science and technology needs appreciation, especially for coaches in Indonesia [2]. The results are the same as research conducted by Widiastuti & Mashud interactive multimedia developed will facilitate swimming training and is feasible to implement [3, 30].

Although previously Sugiyanto research had been carried out on the integration of mobile learning and project-based learning [31], and Haryanto innovation media learning, online project-based learning (O-PBL) [32]. However, researchers have not found research on the integration of project-based learning models with interactive multimedia in physical education, especially those that discuss breaststroke swimming. So that this can be a research update and strengthen the importance of this research to be carried out. That way, this research will be able to contribute to the strategies and learning models used. In his research Saeed applying multimedia provides an advantage in the learning process [33]. Based on these problems, this study aims to provide evidence of the integration of project-based learning models with interactive multimedia to improve students' breaststroke swimming skills.

Materials and Methods

Participants

This research will be conducted in a swimming pool located on the main campus of the Department of Sports and Health Education, Teaching and Education Faculty, Lambung Mangkurat University from September 2022 to November 2022. The researchers determined the sample in this study using purposive sampling with a total sample of 90 students, namely 45 experimental groups and 45 control groups.

Research Design

The effectiveness model used in this study is experimental. The method used is a quasi-experimental design with pretest posttest non-equivalent control group design. In this method given different treatment in the experimental group and the control group. In this study the experimental class will be treated with a project based learning model with interactive multimedia while the control class will be treated with a conventional learning model. This study was initiated by administering a pretest to the experimental and control groups, then the experimental group was given a project based learning model treatment with interactive multimedia for 8 meetings. Then a posttest was given to the experimental and control groups to see the effect of the treatment on the experimental group.

The instrument for the results of breaststroke swimming skills was designed by researchers, based on the theory of swimming experts. Especially for the breaststroke swimming instrument, it is divided into: 1) concept; 2) breaststroke swimming indicator; and 3) descriptors (description of indicators). The concept is breaststroke swimming which is divided into 7 (seven) indicators, such as: 1) start; 2) body position; 3) leg movements; 4) arm movement and

recovery; 5) breath movement; 6) coordination movement; and 7) reversal movement. Of the 7 (seven) indicators, each is further divided into 5 descriptors. So the total number of descriptors for the breaststroke swimming instrument is 35 items. It is from these 35 descriptor items that the tests scores are obtained.

In order to find out whether the instrument used was feasible, testers 1 and 2 were first tested with a sample of 15 students of the Physical Education Study Program. Where the results show for n = 15 and an error rate of 5%, it is obtained r table = 0.514 and an error level of 1% r table = 0.641, because r count is greater than r table (0.966 > 0.641 > 0.514), it can be concluded that the swimming ability instrument reliable.

Statistical Analysis

The research data was analyzed in a quantitative descriptive manner to provide a summary of research data and to facilitate the presentation of research data. Data showing normal distribution were analyzed using the t test to test the difference in the average pretest and posttest results in the experimental group and the control group, as well as the significance assisted using the SPSS 26 application.

Results

Quasi-experimental research, such as the existence of different treatments in the experimental group and the control group. In this study the experimental group was treated with a project based learning model with interactive multimedia (PBL-interactive multimedia) and the control group (Conventional). Before being given the effect test and the different test, first carry out the normality prerequisite test, if the data is normal, it will use the t-test and if it is not normal, it will proceed with the nonparametric test.

Based on the results of the normality test with the Kolmogorov-Smirnov formula, it shows that the significance value is p> 0.05, so in conclusion the data shows normal, then the t-test will be continued. The results of the normality test can be seen in table 1.

The results in table 2 of the hypothesis test on the indicators of the experimental group
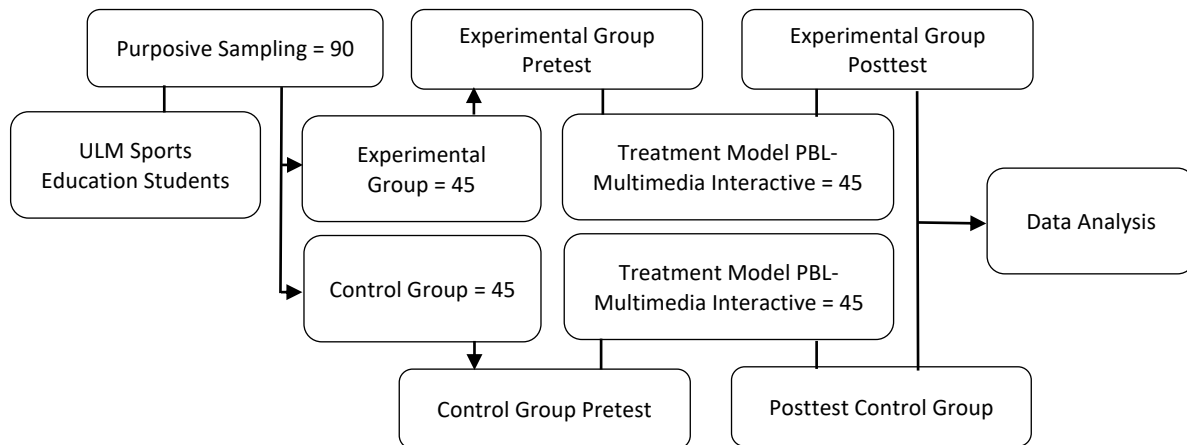

Figure 1. Chart of research procedures

Table 1. Kolmogorov-Smirnov normality prerequisite test

Result	Statistics	df	Sig.
Experiment Pretest	0.097	45	.200 *
Posttest Experiment	0.117	45	.144
Pretest Control	0.107	45	.200 *
Posttest Control	0.118	45	.129

Table 2. Paired samples test results of the t-test

Pairs	Result	Means	std. Deviation	t	df	Sig. (2-tailed)
Pair 1	Experimental Pretest - Experimental Posttest	-6.467	3.653	-11.875	44	0.000
Pair 2	Pretest Control - Posttest Control	-3.089	3.502	-5.917	44	0.000

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with the PBL-Multimedia Interactive treatment show a significance value of 0.000 <0.05, so these results provide evidence that the PBL-multimedia interactive model provides a significant increase in the results of breaststroke swimming skills.

Furthermore, the control group showed a significance value of 0.000 <0.05, so these results also provide evidence that the conventional model actually provides a significant increase in the results of breaststroke swimming skills. Based on the results of the analysis of hypothesis testing, it can be concluded that the PBL-interactive multimedia model and the conventional model can be applied to improve breaststroke swimming skills. Seeing these results, the researcher wants to see the difference in the effect given, so that the model can be proven more effective to use.

Based on the results of the homogeneity test, it shows a significance value of 0.085 > 0.05, so the result is homogeneous, then it will be followed by a different test with the Independent Samples t Test formula. The normality test results can be seen in table 3.

The results in table 4 to find out the difference in the pre-test scores of the experimental group and the pre-test of the control group, the results show a significance value of 0.912 > 0.05 so there is no significant difference in the pre-test of the PBL-Multimedia Interactive experimental group with the pre-test control group (Conventional).

The results in table 4 to find out the difference in the pre-test values of the experimental group and the pre-test of the control group, the results show a significance value of 0.001 <0.05, so the post-test of the PBL-Multimedia Interactive experimental group and the post-test of the control group (Conventional) there is a difference significant influence. Based on these results, it proves that the PBL-Multimedia Interactive model is more effective than the conventional learning model (tabl.5). So the PBL-Multimedia Interactive model is more recommended to improve breaststroke swimming skills.

Based on table 6 it can be seen that the minimum, maximum, mean, and standard deviation on pretest and posttest data with PBL-Multimedia Interactive model treatment proves that the posttest scores are better, but the difference is not too big. For more details can be seen in Figure 2.

Table 3. Test of homogeneity of variances

Learning	Result	Levene Statistics	df1	df2	Sig.
Breaststroke Swimming	Based on Means	2.240	3	176	0.085

Table 4. Difference test of experimental pre-test (PBL-multimedia interactive) and control pre-test

Results	Group	F	Sig.	t	df	Sig. (2-tailed)
Swimming breaststroke	Experimental Pre-test and Control Pre-test	0.282	0.596	0.111	88	0.912

Table 5. Difference test of experimental post-test (PBL-multimedia interactive) and control post-test

Result	Group	F	Sig.	t	df	Sig. (2-tailed)
Swimming breaststroke	Experimental Post-test and Control Post-test	0.266	0.607	3.408	88	0.001

Table 6. Descriptive analysis of pre-test and post-test data on breaststroke swimming ability results

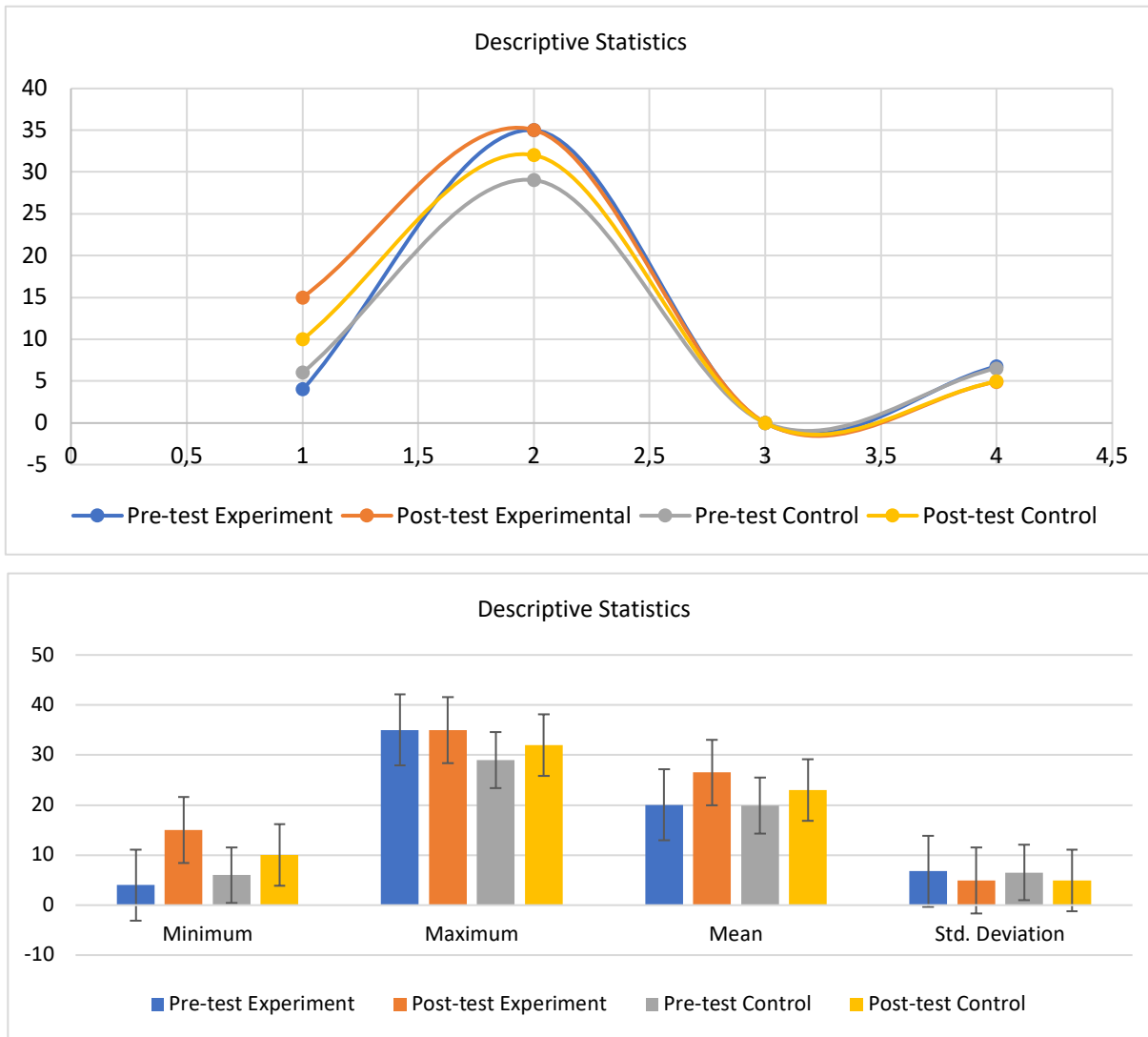| Group	N	Minimum	Maximum	Means	std. Deviation
Pre-test Experiment	45	4	35	20.04	6.759
Post-test Experimental	45	15	35	26.51	4.888
Pre-test Control	45	6	29	19.89	6.516
Post-test Control	45	10	32	22.98	4.947

Figure 2. Descriptive data of pre-test and post-test of breaststroke swimming ability

Discussion

This study aims to provide evidence of the effect of integrating project-based learning models with interactive multimedia on improving students' breaststroke swimming skills. The results showed that the average value of the posttest experimental group (26.51) and the control group (22.98) was greater than the pretest value of the experimental group (20.04) and the control group (19.89). Furthermore, the result of the calculated t value is greater than t table, and the results also show significant. From these results it can be concluded that the PBL-Multimedia Interactive model and the conventional model show a significant increase in the learning outcomes of breaststroke swimming. Previous research by Sugiyanto provides evidence that the Integration of Mobile Learning and Project Based Learning has an increasing effect on the competency of vocational high schools [31]. Furthermore, it has been proven that media-based online project-based learning is appropriate for use

in automotive engineering drawing subjects [32].

Other studies have found that swimming skills can also be improved by doing swimming exercises for 33 weeks, and have a positive effect on health [33, 34]. In addition, providing special training to swimmers can improve performance during competitions [35]. Research by Gülbin that the performance of male swimmers is also influenced by using core training, where this exercise has a positive effect [36]. Several studies have shown that playing approaches, authoritarian teaching styles, and democratic influences affect students' swimming abilities [37, 38]. To improve safety skills in swimming, you can apply traditional swimming teaching, but do not reduce student drowning injuries [39]. Subsequent studies, to improve performance in swimming do more strength training [40].

The results of the study also show the difference in the influence of the PBL-Multimedia Interactive model and the conventional model, where the PBL-Multimedia Interactive model is more effective. These results are reinforced by Susena proving

that swimming based on interactive multimedia applications shows very good criteria [7]. A study has proven that multimedia-based swimming learning provides an increase in backstroke swimming [33], and multimedia learning proves its superiority compared to learning without multimedia. The results of this study are reinforced by Widiastuti that with the existence of a learning model with interactive multimedia that is being developed [3], it is hoped that it can be an alternative to conventional methods. Based on this review, it reaffirms the application of interactive multimedia-based learning, where this is done following increasingly advanced technological developments. In this way, the results of research on the integration of project-based learning models with interactive multimedia can also be considered as a learning model that utilizes technological advances in the field of sports.

Conclusions

The results of the research and discussion have a strong foundation related to the Interactive PBL-Multimedia model, on the basis of references from the research listed previously in the discussion of results and discussion. Where these findings have resulted in several conclusions. The results of the study prove that the PBL-Multimedia Interactive model and the conventional model have a significant effect on improving students' breaststroke swimming skills. These findings also show a significant difference between the Interactive PBL-Multimedia model and the conventional model, namely the Interactive PBL-Multimedia model is more effective for improving breaststroke swimming skills. The results of this study have provided a new reference related to breaststroke swimming practice learning, and added evidence that the integration of project-based learning models with interactive multimedia is more advisable to improve swimming skills, especially breaststroke. The weakness of the research lies in the activities and warm-up carried out by students before the final test is carried out. In addition, the physical condition of students who are not fully monitored is also one of the research weaknesses. Recommendations for further research can apply the PBL-Multimedia Interactive model to other swimming skills, it is known that swimming is popular with 4 styles namely freestyle, butterfly, backstroke and breaststroke.

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Conflict of interest

There is no conflict of interest.

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Information about the authors:

Mashud; (Corresponding author); https://orcid.org/0000-0003-3107-7134; mashud@ulm.ac.id; Departement Physical Education, Sport and Health, Universitas Lambung Mangkurat; Banjarmasin, Indonesia.

Syamsul Arifin; https://orcid.org/0009-0006-2330-2564; syamsul_arifin@ulm.ac.id; Departement Physical Education, Sport and Health, Universitas Lambung Mangkurat; Banjarmasin, Indonesia.

Advendi Kristiyandaru; https://orcid.org/0000-0003-0085-6063; advendikristiyandaru@unesa.ac.id; Departement Physical Education, Sport and Health, Universitas Negeri Surabaya; Surabaya, Indonesia.

Y Touvan Juni Samodra; https://orcid.org/0000-0003-4850-1990; tovan@fkip.untan.ac.id; Department of Sport Coaching Education, Faculty of Teacher Training and Education, Universitas Tanjungpura; Pontianak, Indonesia.

I Gusti Putu Ngurah Adi Santika; https://orcid.org/0000-0001-7873-0060; ngurahadisantika@gmail.com; Department of Physical Education Health and Recreation, Faculty of Teacher Training and Education, Universitas PGRI Mahadewa; Bali, Indonesia.

Didi Suryadi; https://orcid.org/0000-0002-0206-9197; didisurya1902@gmail.com; Department of Sport Coaching Education, Faculty of Teacher Training and Education, Universitas Tanjungpura (Pontianak, Indonesia). Department of Sport Science, Faculty of Sport Science and Health, Universitas Negeri Yogyakarta (Yogyakarta, Indonesia).