Journal Of Sport Education (JOPE)
Available online on http://jope.ejournal.unri.ac.id/php.index/jope
Volume 7, Nomor 1, 2024: 1-17
DOI:http://dx.doi.org/10.31258/jope.7.1.1-17

PENGEMBANGAN BAHAN AJAR PEMBELAJARAN SEPAK TAKRAW BERBASIS APLIKASI *ANDROID EDU-TOUCH* PADA PESERTA DIDIK KELAS VIII DI SEKOLAH MENENGAH PERTAMA

DEVELOPMENT OF APPLICATION-BASED SEPAK TAKRAW LEARNING TEACHING MATERIALS ANDROID EDU-TOUCH FOR STUDENTS AT JUNIOR HIGH SCHOOL

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Received: 2024-07-16; Revised: 2024-11-21; Accepted: 2024-11-23

Abstrak

Tujuan pengembangan produk smartphone berupa aplikasi *edu-touch* pada materi pembelajaran sepak takraw sebagai bahan ajar dapat meningkatkan efektifitas dan efisiensi proses pembelajaran, Metode penelitian dan pengembangan (*reseacrh & development*) ini menggunakan model dan pendekatan 4d yang di kemukakan Thiagarajan, yang terdiri dari 4 tahap: *analysis, design, development, implementation.* Responden yang digunakan dipenelitian ini seluruhnya 6 guru PJOK dan 80 peserta didik dari dua sekolah yaitu SMPN 1 Paciran dan SMPN 1 Brondong. Instrumen yang digunakan dalam penelitian ini mengunakan angket yan disusun secara uji validitas dan reliabilitas. Persentase dari para ahli sebanyak 96% oleh ahli pembelajaran, 88% oleh ahli materi, dan 80% oleh ahli media, maka produk pengembangan valid/layak digunakan. pada uji keefektifan pada kelompok kecil dan kelompok besar diperoleh nilai 81,25% dan 79,78%, maka keefektifan produk pengembangan tergolong baik. Hasil analisis data uji kelompok kecil dan kelompok lapangan sebesar 81,25% dan 80,10%, dalam hal ini produk pengembangan termasuk dalam kategori sangat layak. Sehingga dalam penelitian ini ditarik kesimpulan sangat layak digunakan aplikasi *edu-touch* untuk materi sepak takraw berbasis smartphone untuk tingkat satuan pendidikan menengah pertama.
Kata kunci: bahan ajar, sepak takraw, aplikasi *edu-touch*

Abstract

The objective of developing a smartphone product in the form of the Edu-Touch application for sepak takraw learning materials as teaching material is to enhance the effectiveness and efficiency of the learning process, research, and development method (research & development) this uses the 4D model and approach put forward by Thiagarajan, which consists of 4 levels: analysis, design, development, implementation. The respondents used in this research were all 6 PJOK teachers and 80 students from two schools, namely SMPN 1 Paciran and SMPN 1 Brondong. The instrument used in this research used a questionnaire which was prepared to test validity and reliability. The percentage of experts is 96% learning experts, 88% by material experts, and 80% media experts, so the development product is valid/fit for use. In the effectiveness test in small groups and large groups, the values obtained were 81.25% and 79.78%, so the effectiveness of the development product was classified as good. The results of the analysis of small group and field group test data were 81.25% and 80.10%, in this case, the development product was included in the very feasible category. So in this research the conclusion is drawn that the application is very suitable for the use of edu-touch for smartphone-based sepak takraw material for junior secondary education unit level.
Keywords: *teaching material, sepak takraw, applications edu-touch*

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

How To Cite: Nurrochmah, S, Darmawan, A. Ittaqwa, I. (2024). Development of application-based sepak takraw learning teaching materials android edu-touch for students at junior high school. *Journal Of Sport Education (JOPE)*, 7 (1), 1-17. doi:http://dx.doi.org/10.31258/jope.7.1.1-17

INTRODUCTION

Technological developments indirectly influence human life personally and socially, as can be seen from today's habits where everyone uses advanced technology in their activities. The era of the Industrial Revolution 4.0 is an era where all information is open and can be accessed anywhere, by anyone throughout the world (Winarno, 2019). The impact on the world of education by following increasing developments. A possibility that the world of education will be very dependent on technology in the future (Rodriquez et al., 2020). The Industrial Revolution 4.0 has spread globally, transforming ways of thinking and significantly impacting the field of education. The competencies developed during the learning process will be implemented in the workforce, aligning with the demands of this revolutionary era. (Indriani et al., 2021). One of the innovations in the Industrial Revolution 4.0 is Education 4.0 before the pandemic, education 4.0 was seen as having transformative prospects in the higher education sector (Chaka, 2022), in its aim education 4.0 ensures that the teaching and learning experience will take advantage of the unlimited opportunities created by technology advanced (Alda et al., 2020), teaching staff are required to have content capabilities and technological pedagogical knowledge or abbreviated TPACK in english, in components TPACK Learning media are tools that teachers can use (Febrianti et al., 2021), multimedia teaching materials and learning media in physical education can not only facilitate the learning process but can also meet students' learning needs (Lv et al., 2021).

The availability of learning resources with indepth photos and videos will help physical education teachers in their responsibility to help students master physical education skills (Irsyada et al., 2023), to achieve this in learning media consisting of explanations of movements fundamental (Darmawan, 2018), therefore the media must be prepared well so that the learning process can be easily carried out to create a learning process that is effective, efficient, and attractive when learning takes place (Majid et al., 2020), thereby modifying the time Learning can also improve students' self-concept (Adi, 2023), the concept of independent learning. In the context of the increasingly rapid spread of learning media and increasing levels of intelligence.

Currently, learning media for sepak takraw is very limited, given that this sport has only recently been introduced into the independent curriculum. The development of teaching materials and other related media is crucial for enhancing sepak takraw education. According to (Kasanrawali et al., 2023), students who are new to sepak takraw need guidance through appropriate media. Additionally, as noted by (Bangko et al., 2023; Bloom & Reenen, 2019), when they learn sepak takraw they feel afraid because the ball they use is too hard. Teaching sepak takraw must be creative and innovative because media supports the learning process (Bangko et al., 2023; Handayani et al., 2022; Maulana et al., 2019).

Sports education is currently developing along with technological advances in the current modern era so many experts are developing research technology using smartphones. Research and development showing smartphone use among teenagers is relatively growing, especially in the educational context. (Bangko et al., 2023) carried out studies on the usage of cellphones in higher education, for instance. According to their findings, students share knowledge via smartphones. On the other hand, (Arwandi et al., 2023) show that students tend to use smartphones for fun, not for learning. Thus, studies conducted by them show that the more students use their smartphones, the lower their academic performance. Analogous Studies (Arwandi et al., 2023; Reenen, 2023) Through the use of basic statistical technologies,

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

this research and development gathers some data regarding learning demands during the teaching process.

The development of teaching materials in the form of Android-based applications, it can later be optimized and become a breakthrough for physical education teachers to add learning media innovation to sepak takraw learning (Hakim, 2017; Hanafi & Prastyana, 2020), using multimedia learning media will make it easier in understanding the basic material of playing sepak takraw (Reenen, 2023; Semarayasa et al., 2023). Utilizing articulate interactive learning media can also increase students' interest in learning (Yolanda et al., 2022) and also has a good effect in increasing learning motivation and understanding in learning (Kasanrawali et al., 2023). The sepak takraw material learning system can achieve the desired function of educational learning objectives at the secondary unit level (Lin, 2022), and students can change passive learning to active to encourage changes in sepak takraw learning in junior high schools (Bangko et al., 2023), emerging digital relationships can push the boundaries of sepak takraw learning media (Lawrence & Crawford, 2022). Referring to several theories above, this research and development aim to test and develop teaching materials based on sepak takraw learning materials. smartphone edu-touch at the junior secondary education unit level.

METHOD

This research and development model uses the 4D Model (define, design, develop, disseminate) proposed by Thiagarajan in 1974 (Al-tabany, 2017) and consists of four stages: definition, design, development, and dissemination. The 4D model was chosen because it offers a systematic and structured approach to research and development. Its advantages include clear stages that facilitate planning, a focus on user needs during the definition stage, and a more effective product design based on needs analysis. Additionally, the development stage involves trials to identify and address shortcomings before dissemination, ensuring that the product can be widely accessed and utilized. Thus, this model guarantees the development of quality products that can be effectively implemented in the field. This tests for product development SMP Negeri 1 Paciran and SMP Negeri 1 Brondong at Lamongan Regency. The small group test consists of 30 students, and the large group consists of 80 students from both schools. The experimental design for the research and development of sepak takraw teaching materials consists of two stages. The first stage involves validation by material, media, and learning experts to ensure the quality and relevance of the product. In the second stage, product testing will be conducted with the involvement of students and PJOK teachers at SMP Negeri 1 Paciran and SMP Negeri 1 Brondong, Lamongan Regency, to gather the necessary feedback for refining the teaching materials.

In this research and development, two types of data were obtained: quantitative and qualitative. Quantitative data were collected through respondents' completion of questionnaires, which were then statistically analyzed to identify specific patterns and trends. Meanwhile, qualitative data were gathered through interviews, observations, or group discussions, providing indepth insights into respondents' views, experiences, and perceptions of the products being studied. These responses were collected to analyze the respondents' needs for the products produced during both small-group and large-group trials, based on their answers to the questions and statements listed on the questionnaire instrument. Qualitative data were obtained from the results of the media expert validation questionnaire, learning expert validation, material expert validation, and student responses. This qualitative data is presented descriptively in effectiveness tests and expert suggestions. In this study, experts were selected based on criteria such as academic degrees and certifications, significant work experience in their respective fields, and their reputation within the scholarly community, while student response questionnaires and to be decided as a whole as a basis for

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

testing media products. This research and development uses non-test instruments in the form of questionnaires and interviews, and data collection uses questionnaires and interview techniques. Data analysis techniques were carried out at the small group level and field tests. Small group trials and field trials are conducted on the product at least twice to test effectiveness. Trials were also carried out to test the validity and reliability of the questionnaire instrument components.

To test the teaching materials developed in this research. Data obtained from expert validation questionnaires, student responses, and the attractiveness of developing learning-based teaching materials smartphone edu-touch using a percentage technique formula, namely descriptive percentage, then the effectiveness test also uses a percentage calculation (%).

This research only conducted an effectiveness test, as the school allowed the evaluation of learning effectiveness based on the products produced. It is a test of a product that has been developed involving the product being developed (Gall et al., 2003). Testing the validity and reliability of surveys/questionnaires is important as an important research tool that will be used (Taherdoost et al, 2016). Reliability refers to the accuracy or repeatability of test scores, Validity conventional is defined as the extent to which the test measures what it is intended to measure, and test validation is the process of gathering evidence to support the conclusions made by the test scores (Chiu & Pang, 2017).

Table 1. Percentage Table

Criteria	Information	Meaning
75,01%-100,00%	Very effective	Used without revision
50,01%-75,00%	Effective enough	Used with minor revisions
25,01%-50,00%	Ineffective	Cannot be used
00,00%-25,00%	Very Ineffective	Forbidden to use

RESULT

This research was carried out using the Thiagarajan 4D model, which consists of four stages: definition, design, development, and deployment (Al-tabany, 2017). Effectiveness tests were carried out on small and large groups. The following are the results of product revisions and data obtained by researchers from results, effectiveness tests, and student responses, validity and reliability tests of questionnaire instrument items, in product development based on smartphone edu-touch on the sepak takraw lesson material at SMP Negeri 1 Paciran, SMP 1 Negeri 1 Brondong as follows:

1. Definition

The analysis is carried out in six steps: (1) initial and final analysis, (2) requirements (3) analysis, (4) student analysis, (5) concept analysis, (6) task analysis, and formulation of learning objectives. There is no use of electronic media and monotonous learning in the very important first step of problem definition. As a result, if modules are simply given to read, most students will not understand the material. To fix the problem above, a product was created that can help students in learning with Android-based teaching materials. The purpose of this analysis is to analyze how important it is to develop product-based teaching materials *smartphone android* for teachers and students, as well as characteristics that are appropriate to the design and development of the product. Concept analysis is proposed to systematically select, detail, and determine the relevant concepts to be taught based on the initial final analysis. This analysis is carried out to formulate the results of the task analysis

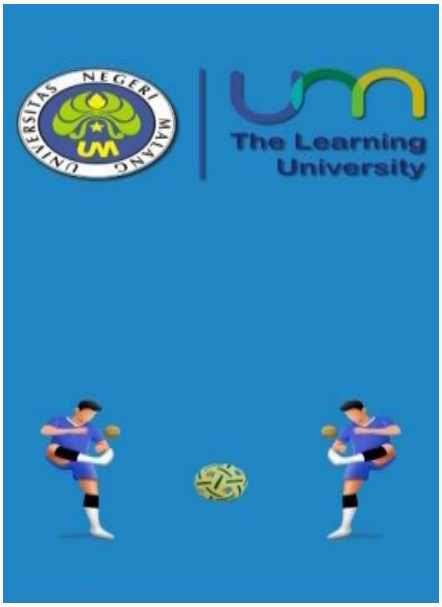
ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

and concept analysis that have previously been carried out into specific learning objectives that will be achieved.

2. Design

At this stage, the development product is designed which contains material from sepak takraw teaching materials referring to the teaching module plan prepared based on phase D of the independent curriculum, along with the appearance of the product design.

a) Opening Display



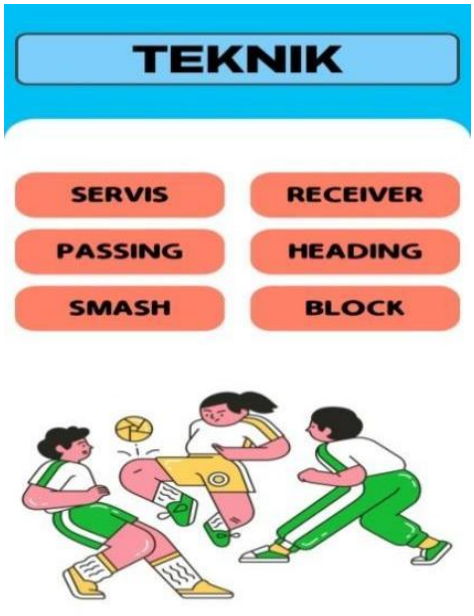
Main Menu Plication Opening Display Edu-Touch

b) Material Menu

Picture 1. Application curriculum menu

Picture 2. History menu in the application

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)



Picture 3. Application engineering menu

Picture 4. Application training menu

Picture 5. Facilities and infrastructure menu

Picture 6. Application model menu

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

c) Material Contents Menu

Picture 10. Operational menu for application techniques *edu-touch*

Picture 11. Operational menu for application techniques *edu-touch*

3. Development

The results of product development validation analysis by material experts obtained percentage data of 88%, by learning experts obtained percentage data of 80%, and by media experts obtained percentage data of 96%. So, from the calculation results of these 3 experts, it can be concluded that the product that has been developed has met the validity score criteria.

4. implementation

There are two stages of implementation, namely the first implementation stage for small groups of 10 students and the second implementation stage for large groups or large fields with a total of 80 students. The students received a response questionnaire and an attractiveness questionnaire. The percentage of data obtained from the small group response survey results was 81.25%, the large group was 80.10%, and in the small group product feasibility survey the percentage from the large group was 79.78%, namely 81.25%. As a result, the response rate and product feasibility can be very good and attractive.

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Expert Validity Test

1) Validity of material experts

The material expert who is the validator in the development research is a lecturer at the Physical Education, Health and Recreation Study Program, Faculty of Sports Sciences, State University of Malang. Researchers chose him as a material expert because of his competence in the field of sports material, especially sepak takraw learning material.

Material expert data collection was carried out on October 27, 2023, obtained by providing the initial product "*edu-touch"* as well as assessment sheets in the form of questionnaires or questionnaires. The data from the material experts can be seen in Table 1 below:

Table 2. Material Expert Validity Results

No	Rated aspect	score	Information
1	The truth of the content of the material	3	Very good
2	Free from conceptual errors	4	Very good
3	Up to date and up to date *up-to-date* material	4	Very good
4	Coverage and depth of material	3	Good
5	Suitability of sepak takraw technique on theory	4	Very good
6	Suitability of sepak takraw rules on theory	3	Good
7	Suitability of theoretical sepak takraw infrastructure	3	Good
8	Suitability of tactics and theoretical sepak takraw formations	3	Good
9	Suitability of sepak takraw refereeing to theory	3	Good
10	Suitability of sepak takraw history on theory	4	Very good
	Amount	**35**	**Very good**
	Percentage	**88%**	**Very good**

Results of application media expert validity calculations *smartphone edu-touch* in the sepak takraw subject that has been developed it has met the validity score criteria with a percentage score of 88% in the very valid category.

2) Validity of Learning Experts

The expert validator who is the learning validator in this development research is a lecturer at the Physical Education, Health and Recreation Study Program, Faculty of Sports Sciences, State University of Malang. Researchers chose him as a learning expert because of his competence in the field of sports learning, especially sepak takraw material.

Material expert data collection was carried out on October 31, 2023, obtained by providing the initial product "*edu-touch"* as well as assessment sheets in the form of questionnaires or questionnaires. The data from the material experts can be seen in Table 2 below:

Table 3. Learning Expert Validation Results

No	Rated aspect	Score	Information
1	Suitability of material and competence	3	Good
2	Suitability of presentation of learning concepts	4	Very good
3	The appropriateness of the achievement of learning indicators	4	Very good
4	Suitability of material descriptions according to learning	3	Good

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

No	Rated aspect	Score	Information
5	Suitability of Methods to Learning Objectives	4	Very good
6	Suitability of explanation of learning concepts	4	Very good
7	Suitability of accuracy of learning materials	4	Very good
8	Appropriateness of the relationship between learning concepts	4	Very good
9	Suitability of the formulation of the definition of learning	4	Very good
10	Effectiveness of sepak takraw learning	4	Very good
11	Suitability of Media to Learning Objectives	4	Very good
12	Relevance of the task to learning	4	Very good
	Amount	**46**	**Very good**
	Rate-rate	**96%**	**Very good**

The results of these calculations concluded that learning media is based on *smartphone edu-touch* the sepak takraw material that has been developed has met the validity score criteria with a percentage score of 96% in the very valid category.

3) Media Expert Validity Test

The material expert who is the validator in this development research is an expert lecturer in Informatics at Lamongan Islamic University with a doctorate and master's degree in informatics. Researchers chose him as a material expert because of his competence in the field of computer programming and application coding.

Media expert data collection was carried out on November 25, 2023, obtained by providing the initial product "*edu-touch"* as well as assessment sheets in the form of questionnaires or questionnaires. The data from the material experts can be seen in Table 3 below:

Table 4. Media Expert Validity Results

Aspect		Score	Total Shoes	Criticism & Suggestions
Opening screen	Animation selection	3	75	● Add an opening animation *futuristic* with the theme of physical education, especially takraw ● The font of the title 'Application Menu' should be changed in type, given an effect *emboss/outer/inner* gear interesting ● The opening music is not heard the first time the app is opened, check the *setting* on the *builder*. Music during the study is good ● The animation is still stiff, the movements are
	Font selection	3		
	font size	4		
	Font colour	4		
	Opening music	1		
	Compatibility between animation motion design, *font*, music	3		
	Attractive appearance	3		

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Aspect		Score	Total Shoes	Criticism & Suggestions
				broken, and need to be tweaked *to smooth motion*
Main menu display	Election *background design* Election *animation design* knob. Selection of button images. Election *font* Size selection *font* Election *font* color Selection of musical instruments Suitability *background design*, instrument music, *font*, and animated movements Attractive appearance	4 3 4 3 4 3 4 3 3	86,1	● Button shapes should be varied to avoid boredom ● When explaining the material, the musical instruments should be reduced ● The first time you play music, it's appropriate to *fade in*, and when the video is finished it should be music *fade out* to make it comfortable to hear
Display each Material menu	Election *background design* Selection accuracy *font* Size selection *font* Selection of font color Accuracy in selecting button or button images Suitability of background design, font, and button image Attractive appearance.	4 3 3 4 4 4 4	92,86	● *Font*: in the text below *hexagonal* when explaining the movements the display is very small, and not readable. It's best to increase the font size a little ● The display is very good, but you need to add sweeteners/images to the corners of the screen that are made transparent
Saw	Video quality Ease of buttons or buttons Ease of voice control Ease of video control	4 3 3 4	87,5	● Type *button* It's best to be varied, not just a square with obtuse corners, you can add more *button* circle ● The location of the sound control buttons is not visible, it needs to be made visible
Total Interactive Multimedia Score				**86**
Rate-rate				**80%**
Conclusion			**Can be used for improvements**	

The results of these calculations concluded, that learning media is based on *smartphone edu-touch.* The sepak takraw material that has been developed has met the validity score criteria with a percentage score of 80% in the very valid category.

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Small Group Test

1) Small Group Test at SMP Negeri 1 Paciran

The results of the small group test were obtained by distributing questionnaires to teachers and students with the number of subjects being 1 teacher and 10 students. The results of the qualification include aspects of ease, attractiveness, and clarity in media-based learning products smartphone edu-touch sepak takraw material at SMP Negeri 1 Paciran in class VIII.

Table 5. Product Feasibility Results from Small Group Tests at SMPN 1 Paciran

No.	Aspect	Qualifications	Category
1	Convenience	86,54%	Very Valid
2	Attractiveness	75%	Fairly Valid
3	Clarity	75%	Fairly Valid
Average		**81,25%**	**Very Valid**

From the results of the small group test analysis tested by the Physical Education teacher at SMP Negeri 1 Paciran and 10 students, it was stated that the edu-touch learning media product, sepak takraw material for SMP class VIII was declared very valid with ease of obtaining eligibility of 86.54%, attractiveness of 75%, and 75% clarity. The total feasibility of this small group test was 81.25% and was declared very valid.

2) Small Group Test at SMP Negeri 1 Brondong

The results of the small group test were obtained by distributing questionnaires to teachers and students with the number of subjects being 1 teacher and 10 students. The results of qualifications include aspects of convenience, attractiveness, and clarity in media-based learning products *smartphone edu-touch* sepak takraw material at SMP Negeri 1 Brondong in class VIII.

Table 6. Product Feasibility Results from Small Group Tests at SMPN 1 Brondong

No.	Aspect	Qualifications	Category
1	Convenience	79,38%	Very Valid
2	Attractiveness	79,89%	Very Valid
3	Clarity	81,03%	Very Valid
Average		**79,78%**	**Very Valid**

From the results of the small group test analysis tested by the Physical Education teacher at SMP Negeri 1 Brondong, it was stated that the edu-touch learning media product was sepak takraw material for class VIII junior high schools. From the results of small group tests carried out by students, the product convenience results were 79.38%, attractiveness 79.89%, and product clarity 81.03%. And the average feasibility result was 79.78% with a very valid category.

Large Group Test

1) Large Group Test at SMPN 1 Paciran

Researchers conducted a large group trial with 3 teachers and 40 students as subjects.

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

With eligibility qualifications including convenience, attractiveness, and clarity. The data results from the large group test completed by the PJOK teacher from SMP Negeri 1 Paciran are as follows.

Table 7. Product Feasibility Results from Large Group Tests at SMPN 1 Paciran

No.	Aspect	Qualifications	Category
1	Convenience	82,05%	Very Valid
2	Attractiveness	80,56%	Very Valid
3	Clarity	79,17%	Very Valid
Average		**81,25%**	**Very Valid**

In the results of the large group test tested by 3 PJOK teachers at SMP Negeri 1 Paciran and 40 students, the total percentage of feasibility from the ease aspect was 82.05%, attractiveness 80.56%, and clarity 79.17%. The total average percentage of overall eligibility for media-based learning products *smartphone edu-touch* sepak takraw material for class VIII junior high schools obtained 81.25% and was declared very valid.

2) Large Group Test at SMPN 1 Brondong

Researchers conducted a large group trial with 3 teachers and 40 students as subjects. With eligibility qualifications including convenience, attractiveness, and clarity. The data results from the large group test filled in by the PJOK teacher from SMP Negeri 1 Brondong are as follows:

Table 8. Product Feasibility Results from Large Group Tests at SMPN 1 Brondong

No.	Aspect	Qualifications	Category
1	Convenience	79,70%	Very Valid
2	Attractiveness	80,62%	Very Valid
3	Clarity	81,10%	Very Valid
Average		**80,10%**	**Very Valid**

From the results of the large group test which was tested by 3 PJOK teachers at SMP Negeri 1 Brondong and 40 students carried out by students, the combined average score was 80.10%, with the description of the product convenience being 79.70%, attractiveness 80, 62%, and product clarity of 81.10%. And the product category results were very valid.

Table 9. Effectiveness Test

No	Rated aspect	Earned Value	Mark Maximum	Percentage (%)	Category
1	Product Innovation	215	250	86%	Very effective
2	Product Design	185	250	74%	Effective
3	Product Benefits	178	250	72%	Effective
Total value		**400**	**500**	**80%**	**Effective**

In testing the effectiveness of the application *edu-touch* based *smartphone* to 80 students from two schools, namely SMP Negeri 1 Paciran and SMP Negeri 1 Brondong in the aspect of convenience value, an average score of 86% was obtained, very effective for the aspect of attractiveness, an average score of 74%, very effective in the aspect of clarity, an average score of 72% for the effective category so the total average is 80% for the effective category.

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

So, it can be concluded that this edu-touch application is said to be effective.

DISCUSSION

Application development "*edu-touch*" was designed and developed into an initial product in the form of an application for teaching materials for sepak takraw learning. The development process goes through research and development procedures, starting from the planning stage, media creation process, and evaluation instruments. The product is developed with the help of experts who master techniques and materials. After the initial product is produced, validation tests are carried out by material experts and media validation tests and learning experts.

The Industrial Revolution 4.0 contributes to the positive development of the new millennium education model and the use of modern communication tools that support teaching and learning, attracting students from generations Z and Alpha, multitasking digital generations, always ready to accept changes in the virtual world (Ismail et al., 2020). The main components that characterize Education 4.0 are open access, individualized education, mental transformation, integration of digital technology into education, limitless learning environments, lifelong learning, exploratory education, and multidisciplinary education (Himmetoglu et al., 2021). In Education 4.0, institutions indirectly implement intelligent institutional management systems and learning management software. Education 4.0 encourages students to access more interesting and memorable material and also allows them to achieve better learning outcomes based on their interests. One of the most important methods of *Education 4.0* is digital learning, an effective teaching method to improve student learning (Daud et al., 2015).

At the validation stage, material experts obtained a percentage of 88%, so that at the first validation stage of application development *edu-touch* from the feasibility aspect, the content of the material received the "very appropriate" category with several notes and input. Validation tests from learning experts obtained a percentage of 96% resulting in application development *edu-touch* from the aspect of media feasibility it is categorized as "very feasible". Validation tests from media experts obtained a percentage of 80% resulting in application development *edu-touch* from the media suitability aspect it is categorized as "decent". The small group trial with 10 respondents obtained a research feasibility assessment according to respondents of 81.25%, which means the application media was "very suitable" to be tested. In the effectiveness test on 80 students, the average score was 88.57% effective and the average score was 74%. And the effectiveness of using the application is 80% in the very effective category.

The evolution of educational platforms *e-learning* guarantees a suitable environment for virtual classrooms, and even for schools, because it offers all the facilities students need to learn in modern times (Barreiro & Vladimir, 2022). With the current availability of technology, each teaching staff must be able to develop more complete expertise, knowledge, and skills and have an innovative view of education (Sharma, 2019). Technology has a very positive impact on education and also certainly has negative effects, therefore educators and students must take advantage of this era so that students and institutions can achieve excellence (Maslin, 2021).

Interactive learning creates a diverse atmosphere of positive stimulation and challenges for students, thereby contributing to freedom of communication, equality in communication, development of tolerance and social awareness, self-control and practice, communicative competence, a sense of togetherness, cooperation, understanding and respect for others, empathy, and appreciate differences (Kova & Mikanovi, 2017). *Edu-touch* is programming software that can be used by everyone in terms of delivering information and

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

material by teaching staff. Writing *e-learning* is no longer limited to developer-based applications *smartphones*, it is now wide open for subject matter experts with their content, instructional designers with their project explanations, and graphic designers with their media to work, along with developers, to co-create something excellent (Harnett, 2013).

With the development of this learning media, it can be optimized and become a breakthrough for physical education teachers to add learning innovation in interactive learning media for sepak takraw material (Akhmad et al., 2021). To improve the quality and capabilities of the sepak takraw game, a new learning model is needed that can attract users' attention and enthusiasm for learning. Using a multimedia learning model, will undoubtedly make it easier to understand practical material about the basic techniques of playing sepak takraw because it no longer uses manual learning methods with direct observation through lengthy explanations through stories and short explanations. long and short explanations, from books and other media.

"After going through product trials (one on-one, small group, and large group trials) the advantages and disadvantages of research and application development can be explained "*edu-touch"* as follows:

The first advantages of the tool include: providing solutions for teachers and students to learn sepak takraw material on kumer, provides a new variant in development research that has never existed before, a similar application specifically for sepak takraw, helps optimize the role of teachers to fulfill PJOK teaching materials sepak takraw material, is easy to operate because there is no need to use special online signals and don't use heavy quotas.

The second disadvantages of the tool include: it is not yet recommended for users from other schools at the same level or above and below, as a new application development, it requires further development in the future.

CONCLUSION

This research demonstrates that the development of teaching materials for sepak takraw learning, using the chapter-based smartphone Edu-Touch application, is categorized as very effective, efficient, and attractive in SMP Negeri 1 Paciran and SMP Negeri 1 Brondong. The results indicate significant effectiveness in the developed product. Expert validation further supports the feasibility of the Edu-Touch application for use and development within the institution.

This validation confirms that the product is suitable for educational purposes. Therefore, it can be concluded that the Edu-Touch teaching materials application is appropriate for use, with a suitability percentage of 80%. The implications of this research indicate that the development of sepak takraw teaching materials through the Edu-Touch application has significant potential to enhance the learning process in schools. With a classification of very effective, efficient, and attractive, this teaching material can increase student interest and engagement in learning sepak takraw. This also underscores the importance of integrating technology in education, providing students with broader access to understanding and practicing sports.

REFERENCES

Adi, S. (2023). A new vision of learning frequency in physical education subjects contributes to improved self-concept, physical fitness, and academic achievement. *Journal of Physical Education and Sport*, *23*(3), 658–664. https://doi.org/10.7752/jpes.2023.03081

Akhmad, I., Valianto, B., & Bowo, D. (2021). Interactive Media as Optimization of Understanding Basic Football Techniques in Pandemic Period. *Proceedings of the 4th*

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

International Conference on Sports Sciences and Health (ICSSH 2020), *36*(Icssh 2020), 66–69. https://doi.org/10.2991/ahsr.k.210707.017

Alda, R., Boholano, H., & Dayagbil, F. (2020). Teacher Education Institutions in the Philippines towards Education 4.0. *International Journal of Learning, Teaching and Educational Research*, *19*(8), 137–154. https://doi.org/10.26803/ijlter.19.8.8

Al-tabany, T. (2017). *Mendesain Model Pembelajaran Inovatif, Progresif, Dan Konteksual*. Prenada Media.

Arwandi, J., Bais, S., Zarya, F., Haryanto, J., & Insani, T. (2023). Original Article The effects of training using an android-based media blocker tool on the West Sumatra pelatprov sepaktakraw smash in 2023. *Journal of Physical Education and Sport, 23 (12), 3391- 3399* https://doi.org/10.7752/jpes.2023.12389

Bangko, A. M., Supriadi, A., & Valianto, B. (2023). Utilization of WEB based Technology Through the Sepak Takraw Sports Match Administration System Application. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *7*(3), 682–695.

Barreiro, S., & Vladimir, A. (2022). *Education 4.0 and its impact on the educational system during the pandemic and post pandemic Covid 19 in Ecuador*.

Bloom, N., & Reenen, J. Van. (2019). Developing Snake Ladders Game for Learning Media Of Physical Education Sport And Health To Elementary School Students. In *NBER Working Papers*.

Chaka, C. (2022). Is education 4.0 a sufficient innovative, and disruptive educational trend to promote sustainable open education for higher education institutions? A Review of Literature Trends. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.824976

Chiu, A. Y. Y., & Pang, M. Y. C. (2017). Assessment of psychometric properties of various balance assessment tools in persons with cervical spondylotic myelopathy. *Journal of Orthopaedic and Sports Physical Therapy*, *47*(9), 673–682. https://doi.org/10.2519/jospt.2017.7283

Darmawan, A. (2018). Development of interactive multimedia-based manipulative fundamental movement model for primary school students. *International Journal of Physiology, Nutrition and Physical Education*, *3*(1), 526–531.

Daud, R., Jalil, Z. Ab., & M.Gunawan, M. N. F. (2015). Community College Students' Perception Towards Digital Learning in Malaysia. *Procedia - Social and Behavioral Sciences*, *195*(April 2016), 1798–1802.

Febrianti, E., Wahyuningtyas, N., & Ratnawati, N. (2021). Pengembangan aplikasi ARTS (articulate storyline) materi nilai-nilai budaya masa praaksara di Indonesia. *Jurnal Inovasi Teknologi*, *8*(2), 209–219. https://journal.uny.ac.id/index.php/jitp/article/view/43111

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Meredith D. Gall, Walter R. Borg, Joyce P. Gall -*

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Educational Research_ An Introduction (7th Edition)-Allyn & Bacon (2003).pdf (pp. 569–575).

Hakim, A. A. (2017). Pengembangan Variasi Latihan Sepak Sila Sepak Takraw Untuk Tingkat Pemula. *Indonesia Performance Journal*, *1*(2), 112–118.

Taherdoost, H. A., & Lumpur, K. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. In *International Journal of Academic Research in Management (IJARM)* (Vol. 5, Issue 3). https://hal.science/hal-02546799v1

Hanafi, M., & Prastyana, B. R. (2020). *Metodologi Kepelatihan Olahraga Tahapan & Penyusunan Program Latihan*. Jakad Media Publishing.

Handayani, S. G., Syahara, S., Sin, T. H., & Komaini, A. (2022). Development of android-based gymnastics learning media to improve the ability to roll ahead straddle students in gymnastic learning. *Linguistics and Culture Review*, *6*, 275–290. https://doi.org/10.21744/lingcure.v6nS3.2144

Harnett, S. (2013). *Learning Articulate Storyline* (A. Hussain, Ed.). Packt Publishing Ltd.

Himmetoglu, B., Aydug, D., & Bayrak, C. (2021). Education 4.0: Defining The Teacher, The Student, And The School Manager Aspects Of The Revolution. *Turkish Online Journal of Distance Education*, *21*(July), 12–28.

Indriani, S. M., Artika, W. I., & Ningtias, W. R. D. (2021). Penggunaan Aplikasi Articulate Storyline Dalam Pembelajaran Mandiri Teks Negosiasi. *Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, *11*(1), 25–36.

Irsyada, R., Sudarmono, M., Billiandri, B., & Wijayanti, D. G. (2023). Interactive Learning Media of Football Learning on Physical Education. *Proceedings of the 6th International Seminar on Public Health and Education, ISPHE 2022, 29 June 2022, Semarang, Central Java, Indonesia*, 2–6. https://doi.org/10.4108/eai.29-6-2022.2326087

Ismail, N. A., Wahid, N. A., Yusoff, A. S. M., Wahab, N. A., Rahim, B. H. A., Majid, N. A., Din, N. M. N., Ariffin, R. M., Adnan, W. I. W., & Zakaria, A. R. (2020). The Challenges of Industrial Revolution (IR) 4.0 towards the Teacher's Self-Efficacy. *Journal of Physics: Conference Series*, *1529*(4), 0–6.

Kasanrawali, A., Sinulingga, A., Pratiwi, E., & Hernawan, H. (2023). The Development of Takraw Ball Media for Sepak Takraw Learning for Sports Education Students. *Physical Activity Journal*, *5*(1), 71. https://doi.org/10.20884/1.paju.2023.5.1.9716

Kova, B., & Mikanovi, B. (2017). The Impact of Interactive Learning On The Quality Of. *European Journal of Education Studies*, *2017*, 331–343.

Lawrence, S., & Crawford, G. (2022). Towards a digital football studies: current trends and future directions for football cultures research in the post-Covid-19 moment. *Leisure Studies*, *41*(1), 56–69. https://doi.org/10.1080/02614367.2021.1948595

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)

Lin, H. (2022). Application of Web 2.0 Technology to Cooperative Learning Environment System Design of Football Teaching. *Wireless Communications and Mobile Computing*, *2022*. https://doi.org/10.1155/2022/5132618

Lv, R., Yang, J. Y., & Huang, D. Y. (2021). College Football Teaching Based on Information Technology. *2021 International Conference on Information Technology and Contemporary Sports (TCS)*, 104–107. https://doi.org/10.1109/TCS52929.2021.00030

Majid, W., Adi, S., & Dwiyogo, W. (2020). Pengembangan Bahan Ajar Pembelajaran Pjok Materi Permainan Bola Basket Berbasis Multimedia Interaktif Pada Siswa Kelas XI. *Gelanggang Pendidikan Jasmani Indonesia*, *3*(2), 132–141.

Maslin, N. M. (2021). Impact of Modern Technology. *HF Communications*, *3*, 165–182.

Maulana, A., Pramono, H., & Soegiyanto, S (2019). Developing Android-based Application of Handball Match Statistics for the Coaches in East Kalimantan. *Journal of Physical Education and Sports*, *9*(2), 163–168. https://journal.unnes.ac.id/sju/jpes/article/view/34199

Reenen, J. Van. (2023). Pengembangan Konten Pembelajaran Interaktif Pada Mata Kuliah Teori Praktik Pembelajaran Sepak Takraw. *NBER Working Papers*, 89.

Rodriquez, E. I. S., Dwiyogo, W. D., & Supriyadi, S. (2020). Blended Learning Matakuliah Sepakbola untuk Mahasiswa Pendidikan Jasmani Kesehatan dan Rekreasi. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *5*(2), 206. https://doi.org/10.17977/jptpp.v5i2.13171

Semarayasa, I. K., Gunarto, P., & Preayani, K. K. (2023). Video tutorial-based learning media: A solution to assist students in learning sepaksila sepaktakraw skills. *Journal Sport Area*, *8*(1), 76–86. https://doi.org/10.25299/sportarea.2023.vol8(1).10852

Sharma, P. (2019). Digital Revolution of Education 4.0. *International Journal of Engineering and Advanced Technology*, *9*(2), 3558–3564.

Winarno, P. M. E. (2019). Membangun Pendidikan Indonesia Berbasis Multi Membangun Pendidikan Indonesia Berbasis Multi. *Seminar Nasional UNM*, *November*, 1–7.

Yolanda, S., Winarni, R., & Yulisetiani, S. (2022). The New Way Improve Learners' Speaking Skills: Picture and Picture Learning Media Based on Articulate Storyline. *Journal of Education Technology*, *6*(1), 173. https://doi.org/10.23887/jet.v6i1.41452

ISSN 2654-4474 (Print), ISSN 2654-9069 (Online)