

# Android-Based Learning in Sports Physiology

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## Abstract

This research produces a new product in the form of an Android-based Sports Physiology learning model in the Department of Physical Education, Recreational Health which results in the ultimate goal of competence. This study used the ADDIE model development research method which is a systematic learning design model, which uses 5 steps, Analysis, Design, Development, Implementation, Evaluation. This research was carried out at the Faculty of Sports Science, Physical Education, Health and Recreation (PJKR) State University of Medan in 2021/2022 academic year. The population and sample in this study two classes of students who took the exercise in physiology course. The approach used in this research is a qualitative approach and quantitative approach. The research instruments used were questionnaires, expert observations, and documentation sheets. From the questionnaires given to learning the material and videos physiology material and videos of learning physiology material, 94% were declared very feasible. From the indicators that have been given, the Android-based exercise physiology learning material is very feasible to use. The approach used in this research is a qualitative approach and quantitative approach.

**Keywords:** Android, Android-Based learning, Sports physiology.

## INTRODUCTION

Teaching and learning process is an activity that has educative value. The educative value colors the communication occurring between lecturers and students. Valued communication happens because the teaching and learning activities are directed to achieve the determined design goals before the teaching and learning process. Lecturers consciously plan face-to-face teaching activities systematically by utilizing everything for the benefit of teaching. Every implementation of teaching and learning must have its characteristics, even though every effort to meet the ultimate goal has not been achieved. Many problems happen when the competency demands are expected at the end of the lecture, including facilities and infrastructure, learning methods, learning

media, learning strategies, and meeting times. From the existing problems, it is necessary to re-examine what kind of learning strategy should be used in learning mastery, namely competence. The rapid development of Science and Technology is acknowledged since various research innovations are rapidly growing. Advances in Science and Technology have helped in several human activities, especially in the education field. Since the presence of the information area, there have also been many changes. Technological penetration offers the effectiveness and efficiency of human actions driving various social changes. We always try to keep up with the development of communication technology by including it as the primary need of the family.

The results of initial observations through distributing questionnaires to students who have taken exercise physiology lectures, 35 students stated that 23 students, or 66.7% had difficulty mastering the material given by the lecturer, and 33 students or 93.3% said that the learning method used was only discussion and presentation, 35 students or 100% expressed a desire to modernize lectures to obtain renewable learning models and methods. From the survey results conducted, it is necessary to make improvements and improve the quality of the learning model by applying a digitalization tool for learning exercise physiology which will be applied in the Health and Recreation Physical Education Study Program. The learning model will be designed with learning devices using learning technology by utilizing Android-based digitalization devices.

#### Digitization

The development of technology, especially in the field of information and communication, in the decade before and after the 21st century has made information can be stored, processed, and disseminated quickly, penetrates geographical and cultural boundaries, and is easily accessible openly. Information in various fields can be communicated and obtained through the internet network. In general, this information is at the fingertips means that it relies on the fingers' skill, clicking, or touching computer or mobile phone buttons to get the information. (Prof. Dr. Bp. Sitepu, 2014). The era of abundance of information brings both challenges and opportunities in the education field. One of the opportunities for the education field is integrating technology in the learning process, so that learning outcomes are more effective. However, there are also new problems caused by the shifting of old habits, from the difficulty of finding information to the difficulty of filtering information. (Khomariyah, 2020).

#### Concept of Strategy Development and Learning Model

Research and development methods have been widely used in Natural Sciences and Engineering in almost all technological

products, such as electronic devices, motor vehicles, airplanes, ships, weapons, medicines, and medical devices, along with others. However, it can also be applied in social sciences such as psychology, sociology, education, and management. Research Development is an effort to solve problems by providing or developing a particular product that is used to facilitate or improve work processes. Research development can be utilized in product development to realize superior human development through research. (Mu'arifin, 2021). The term learning model is very close to the meaning of learning strategy and is distinguished from the terms strategy, approach, and learning method. The phrase learning model has a broader definition than a strategy, method, and technique. A strategy is a general approach to teaching that applies in various areas of material used to meet several learning objectives. While the teaching model is a specific approach to teaching and learning that has:

- a. Objectives: The teaching model is designed to help students develop critical thinking skills and gain an in-depth understanding of specific forms
- b. Phases: The teaching model includes a series of steps, often called "phases" that aim to help students achieve specific learning objectives
- c. Foundation: The teaching model is supported by theory and research on learning and motivation (Paul Eggen, 2012)

#### Forms of Learning Resources and Learning Media

Learning is a necessity for everyone in overcoming various problems, challenges and increasing their standard of living. Learning activities are not limited by time and place but require learning resources. How the interaction between the learner and learning resources ranging from the simplest learning resources to technology-based learning resources is. Learning based on various learning resources allows each individual to carry out learning activities according to their learning style, place and time. Advances in technology have been able to present various learning resources in

various forms and skills. However, due to various circumstances and obstacles, there are still places that cannot be reached by advanced technology-based learning resources. One of the learning resources needed is learning media. Media is everything that can be used to channel messages that can stimulate the occurrence of a work process. Media is a combination of tools (hardware) and materials (software) that can be used as messages, people, materials, tools, techniques, and the environment. The benefits of the media include: 1) clarifying the presentation of the message. 2) overcome the limitations of space, time, and memory 3) objects can be large and small. 4) motion can be fast/slow. 5) past events, complex object. 6) complex can be wide/narrow. 7) address the nature of the participants. 8) creating a common experience, and heterogeneous participant perceptions (Zainal Aqib, 2013). Media comes from Latin, the plural form of "medium" which means "intermediary" or "introduction" which is an intermediary or introduction to the source of the message with the recipient of the message. Some experts define learning media as a messenger technology that can be used for learning purposes. Learning media is a medium used in learning, including teacher aides in teaching and the definition of delivering information from learning sources to recipients. (P. S. Informatics, 2019). (Suardi et al., n.d.) stated that the media is one of the crucial tools in conducting learning because using the right media is expected to gradually increase the learning results based on the needs and technological developments. Media are all forms of intermediaries used by humans to convey or disseminate ideas or opinions therefore, they can reach the intended recipient (Arsyad, 2011). The media used can be in the form of miniatures, replicas, images, videos, and applications. Along with the rapid development of technology, it can be used to develop the education field, for instance as a learning support.

The development of technology in communication devices currently quickly passed. Technology turns into a primary need in human life (Study et al., n.d.). Technology

that reaches human life becomes one of the tools or media in learning. Learning media is an intermediary and method used between teachers and students in communicating material during the learning process. Hence, learning activities in schools can take place effectively. Physiology material requires learning media to simulate the material because it is difficult to see directly, while not all existing media meet the needs of students. Some learning media have shortcomings, such as illustrations in books that are not clear enough to incomplete teaching aids that cause the learning process to be less effective in schools. (Alfiana, 2021). The presence of technology and communication (ICT) has a significant influence on changes in various sectors of people's lives. Computers and the internet, for example, are the primary technologies supporting these changes in the field of education. Since the advent of the information age, there have also been many changes. Technological penetration, offering the effectiveness and efficiency of human activity encourages various changes in society. We always try to keep up with the development of communication technology, by including it as one of the primary needs of the family. (Prawiradilaga, 2013).

Advances in technology have been able to present sources in various forms and appearances. However, that cannot be reached by advanced technology-based learning resources. In such a place, it is necessary to be creative in learning and learning to identify and utilize various digital-based learning resources. For particular learning purposes, digital-based learning resources will be more effective in providing learning experiences for students. Technological advances have also penetrated the use of smartphone. The telephone is not only used as a tool of communication it can also be used as learning media. The influence of cellphones nowadays is prominent in the community and also in the education field very quickly with the advancement of cellphone technology many people who use cell phones for learning, including health students, for that the author makes an application as a media to help students learn about anatomy using

android, to make it easier for students to learn when they don't carry books (P. Informatika et al., n.d.)

### Sports Physiology

Media as a source of student learning is a need that is one of the primary factors in achieving learning goals and achievements. The application of media using android applications in physiology courses is expected to be a separate stimulus for students due to changes in various sectors, both in terms of goals in the teaching and learning process (Vera & Maryaningsih, 2021). From the study of physiology and exercise above, we can associate the study of physiology and exercise theory with new theoretical research on exercise physiology where the theoretical study of exercise physiology discusses the work functions of body organs and the involvement of human organs in motion activities. Hence, the notion of exercise physiology is a part or branch of science from physiology that specifically studies the functions/works of body organs and changes that can occur either temporarily or permanently due to physical activity (motion) or physical exercise. Conceptual systems theory in particular has conducted research and has become a fairly useful predictor of teacher and student interactions, learning styles determined by teachers, teacher sensitivity and response to students, and what is most related here is the skill to have competence in using skills and teaching strategies. (Joyce, 2009). The choice of method cannot simply ignore the usefulness of the individual approach so that the teacher in carrying out his duties always takes an individual approach to the students in the class. The problem of children's learning difficulties is easier to solve by using an individual approach, although at some point a group approach is needed (Anggriawan, 2015)

### Android

Technology that is currently popular is smartphones (Mardotillah & Zein, 2017). Smartphones have become a popular technology globally and have become a substitute for previous cellular phones in many

countries nowadays. With the increasing popularity of this smartphone, it can be used as an approach to developing something easier. To run the system on a smartphone there is an operating system. There are three kinds of popular smartphone operating systems, those are the IOS operating system for the iPhone, Android for Android smartphone users, and Windows Phone. When we look forward to the development of information technology, especially in Indonesia, we can consider technology in Indonesia is growing bigger. Along with the existence of information and communication technology, it can make it easier to learn and get the information needed from anywhere, anytime, and from anyone (Ismawanto, 2017). Rapid technology development affects the learning process, learning materials, and the way material is delivered by the teacher.

The advantages offered in this case lie not only in the speed factor for getting information but also in multimedia facilities that can make learning more interesting. In addition to aiming for students to more quickly capture and remember the subjects given by educators, learning methods also continue to be developed so that students are more interested in these subjects. One of the operating systems that have quite a lot of users is Android (Waseso et al., 2015). Android is a mobile software that consists of an operating system, middleware, and applications. The Android operating system is a Linux Kernel-based operating system developed by Google and the Open Handset Alliance and is open to developers in creating and using applications. Because Android has an open-source nature, many application developers (developers) are developing applications that are useful and can be run on the Android system. (RenataWidya Nanda, 2017). Ilham explained that there are advantages and disadvantages when students learn to use smartphones. The advantage is that the combination of smartphones and educational applications can make it easier for students to access learning content for 24 hours. While the disadvantage of learning to use a smartphone, children can become unfocused when learning to use a smartphone.

Because, at the same time they can also learn while accessing other applications such as music, browsing, chatting, and others. (Muhammad Faisal Hadi Putra, 2020)

**Method**

Researchers use research and development methods or Research and Development (R&D). According to Sugiyono (2017: 407). This model was chosen because it is developed systematically and based on the learning design theory. This model is structured programmatically with systematic sequences of activities to solve learning problems related to learning resources following by the needs and characteristics of learners. This model consists of five steps, namely: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. (Ricky et al., 2021) (Tegeh & Pudjawan, 2015). The research design using ADDIE development research, the name implies a model that involves the stages of model development with five steps/development phases including, Analysis,

Design, Development, Implementation, and Evaluate. The ADDIE model was developed by Dick and Carry in 1996 to design an ADDIE model learning system using five stages of development. (Omega et al., 2021).



Figure 1. ADDIE Model

**Results**

Small Group Sample Data

Indicator Variables of Basic Physiology

Table 1. Results of a Small-Scale Trial Questionnaire Conducted by Class A on Basic Physiology Materials

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Material	453	600	76%	Decent
2	Material Videos	388	480	81%	Very Decent
Total		841	1080	78%	Decent

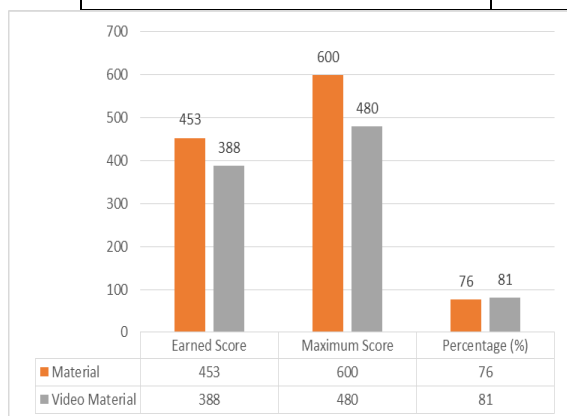


Figure 2. Results of a Small-Scale Trial Questionnaire Conducted by Class A on Basic Physiology Materials

From the distribution of the 18 statements questionnaires given to 15 students, obtain the results of the indicators of sports physiology learning materials are 76% in the decent category for the video display indicator for learning materials, 81% are in the very decent category. The two-tested category the obtained 78% of the total indicators in decent the category.

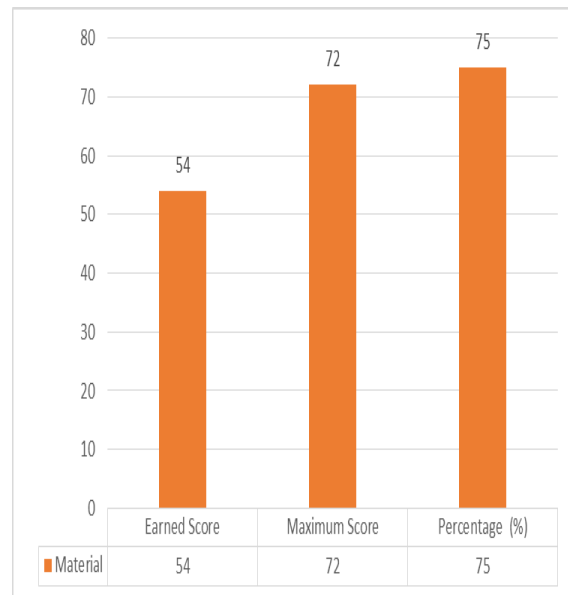
## EXPERT LEARNING VALIDATION

Table 2. *Class A Questionnaire Indicators of Learning Materials Physiology*

No	Name	Earned Score	Maximum Score	Percentage (%)	Category
1	Dr. Marsal	54	72	75%	Decent

Table 3. *Result Data "Development of Android-Based Sport Physiology Learning Device" By Material Expert*

No	Aspects Assessed	Earned Score	Maximum Score	Percentage	Category
				(%)	
1	Material	54	72	75%	Decent

Figure 3. *Result Data "Development of Android-Based Sport Physiology Learning Device" By Material Expert*

From the distribution of the 18 statements questionnaires given to a learning expert, obtain the results of the indicators of sports physiology learning materials are 75% in the decent category for the video display indicator for learning materials, 75% are in the very decent category. The two-tested category the obtained 75% of the total indicators in decent the category.

## VARIABEL INDIKATOR MEDIA APLIKASI FISILOGI

Table 4. *Results of Small-Scale Trial Questionnaire Conducted by Class A About Application Media*

No	Aspects Assessed	Obtained Score	Maximum Score	Percentage (%)	Category
1	Lighting Effect, Subtitle, Image	511	600	85%	Very Decent
2	Video Display, Light Effects, Sound, Slow motion	414	480	86%	Very Decent
Total		925	1080	86%	Very Decent

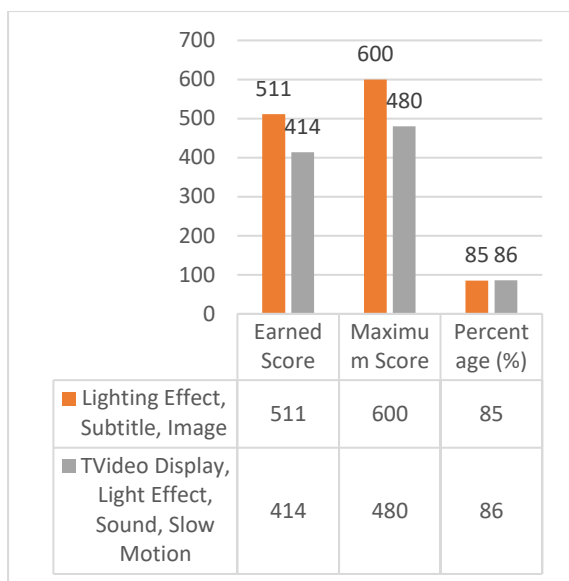


Figure 4. Results of Small-Scale Trial Questionnaire Conducted by Class A About Application Media

From the distribution of the 18 statements questionnaires given to a learning expert, obtain the results of the indicators of sports physiology learning materials are 75% in the decent category for the video display indicator for learning materials, 75% are in the very decent category. The two-tested category the obtained 75% of the total indicators in decent the category.

MEDIA EXPERT VALIDATION

Table 5. Class A Questionnaire Indicators for Application Media Expert

No	Name	Obtained Score	Maximum Score	Percentage (%)	Category
1	Ihwani. S.Kom	60	72	83%	Very Decent

Table 6. Results Data "Development of Android-Based Sport Physiology Learning Devices" By Media Experts

No	Aspects Assessed	Obtained Score	Maximum Score	Percentage (%)	Category
1	Media	60	72	83%	Very Decent

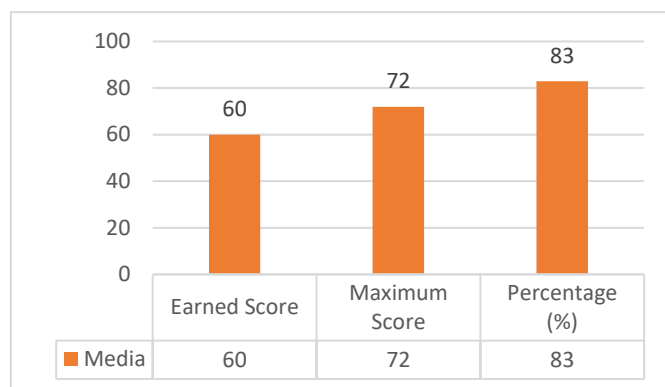


Figure 5. Results Data "Development of Android-Based Sport Physiology Learning Devices" By Media Experts

From the distribution of the 18 statements questionnaires given to a learning expert, the results of the application of sports physiology media with indicators of Lighting Effects, Subtitles, Figures are 83% with proper categories, for Video Display indicators, Light Effects, Sound, and Slow motion 83% with very decent categories. The two-tested category obtained the total category 83% with a very decent category.

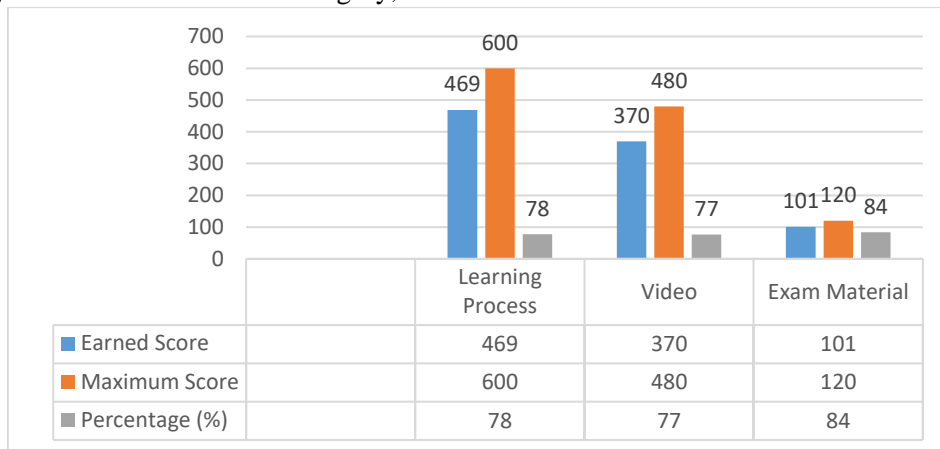
VARIABLES INDICATORS OF BASIC LEARNING MATERIALS FOR SPORTS PHYSIOLOGY (LEARNING EXPERT SECTION)

Table 7. The Results of the Small-Scale Trial Questionnaire Conducted by CLASS A About Learning Materials

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Basic Physiology Learning	469	600	78%	Decent
2	Physiology Learning Videos	370	480	77%	Decent
3	Physiology Exam Material	101	120	84%	Very Decent
Total		839	1080	78%	Decent

From the distribution of the 18 statements questionnaires given to 15 students, the results of the basic learning of exercise physiology with indicators of basic learning of exercise physiology are 78% in the decent category, for

the Video physiology learning indicator 77% in the appropriate category. With the two indicators that have been tested, the total indicator obtained is 84% with a very decent.



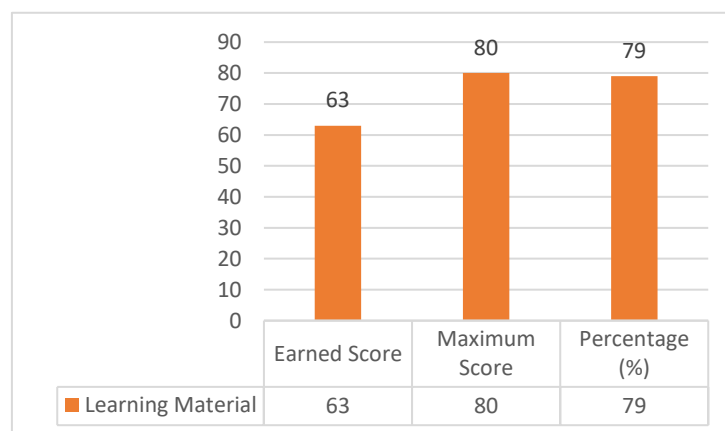
**PHYSIOLOGY LEARNING EXPERT**

Class A Questionnaire Lighting Effect Indicators, Subtitle, Figure 20 Statement

No	Name	Aspects Assessed	Maximum Score	Percentage (%)	Category
1	Dr. Ikhsan	63	80	79%	Decent

Results Data "Development of Android-Based Sport Physiology Learning Devices" By Learning Experts

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Learning Material	63	80	79%	Decent



From the distribution of the 20 statements questionnaires given to an expert the results of

lighting effect indicators, subtitles, pictures, 20 statements, obtained 79% in the decent



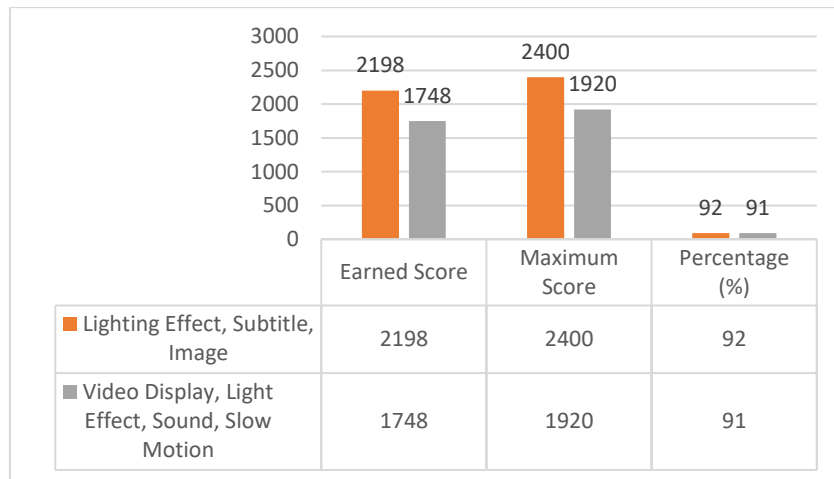
category, for the physiology learning video indicator, 77% in the decent category. With the two indicators that have been tested, the total indicator obtained is 84% with a very decent category.

Results of the Large-Scale Trial Questionnaire Conducted by CLASS A & B About Basic Physiology

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Material	2198	2400	92%	Very Decent
2	Material Video	1748	1920	91%	Very Decent
Total		3946	4320	91%	Very Decent

LARGE GROUP SAMPLE DATA

INDICATOR VARIABLES BASIC PHYSIOLOGY MATERIAL (10 physiology material and video display 8 statement physiology learning material)



From the distribution of the statement questionnaire given to a large sample with physiology material and videos of physiology material, 92% were stated to be very decent and 91% were stated to be very decent. Of the two MATERIAL EXPERT

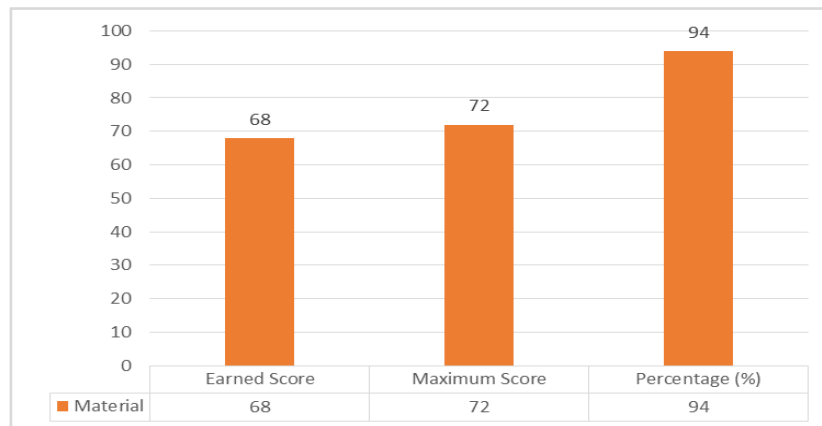
indicators that have been given an assessment, 91% is very decent so that the android-based exercise physiology learning material is very to be use.

Class B Questionnaire Indicators Learning Materials Physiology 18 Statements

No	Name	Earned Score	Maximum Score	Percentage (%)	Category
1	Dr. marsal	68	72	94%	Very Decent

Result Data "Development of Android-Based Sport Physiology Learning Device" by Material Expert

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Material	68	72	94%	Very Decent

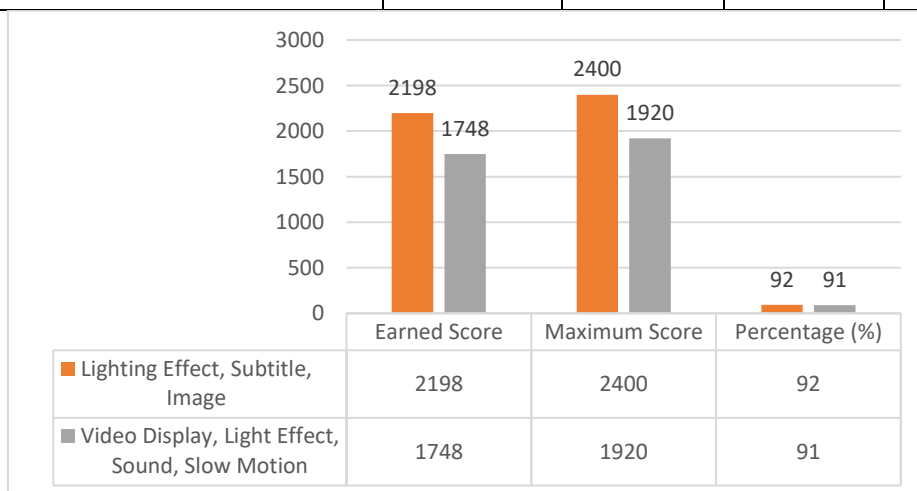


From the distribution of the questionnaire statements given to the physiology material experts, 94% were found to be very decent. From the indicators that have been given, the Android-based exercise physiology learning material is very decent to be used.

**PHYSIOLOGY APPLICATION MEDIA INDICATOR VARIABLES**

Results of the Large-Scale Trial Questionnaire Conducted by CLASS A & B about Application Media.

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Lighting Effect, Subtitle, Image	2198	2400	92%	Very Decent
2	Video Display, Light Effects, Sound, Slow motion	1748	1920	91%	Very Decent
Total		3946	4320	91%	Very Decent



From the distribution of statement questionnaires given to large groups with indicators of lighting effects, subtitles, images obtained 92% very decent and the second indicator is video display. The effects of light, sound, slomotion with the acquisition of 91% are very decent from the total of the two

indicators of 91%, so it is very decent to be used

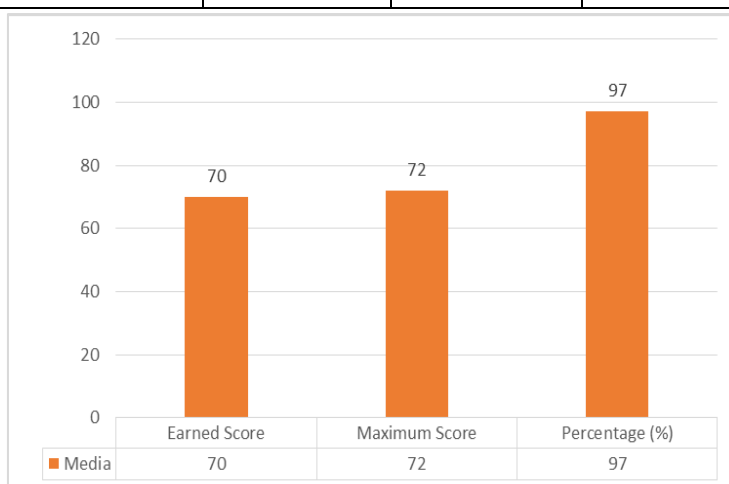
## MEDIA EXPERTS

### Class B Questionnaire Indicators Of Physiology Media 18 Statements

No	Name	Earned Score	Maximum Score	Percentage (%)	Category
1	Ihwani. S.Kom	70	72	97%	Very Decent

Results Data "Development of Android-Based Sport Physiology Learning Devices" by Media Experts

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Media	70	72	97%	Very Decent

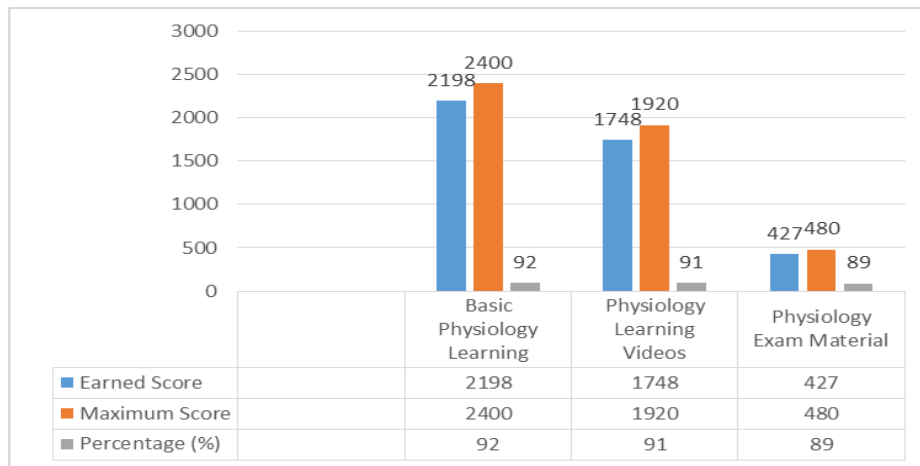


From the distribution of statement questionnaires given to learning media experts with physiology material and videos of physiology material and videos of learning physiology material, 97% were found to be very decent to be used. From the indicators that have been given, the Android-based exercise physiology learning material is very decent to be used.

### INDICATOR VARIABLES BASIC LEARNING MATERIALS OF SPORTS PHYSIOLOGY (LEARNING EXPERT SECTION)

Results of the Large-Scale Trial Questionnaire Conducted by CLASS A & B About Learning Physiology

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Basic Physiology Learning	2198	2400	92%	Very Decent
2	Physiology Learning Videos	1748	1920	91%	Very Decent
3	Physiology Exam Material	427	480	89%	Very Decent
Total		4373	4800	91%	Very Decent



From the distribution of statement questionnaires given to a large sample of classes A and B with physiology material, videos of physiology material and Physiology Exam Materials obtained 92% are declared very decent and videos of learning physiology material obtained are 91% declared very decent

and 89% physiological exam materials are very decent to be used. Of the three indicators that have been assessed, 91% is very decent so that the android-based exercise physiology learning material is very decent to be used

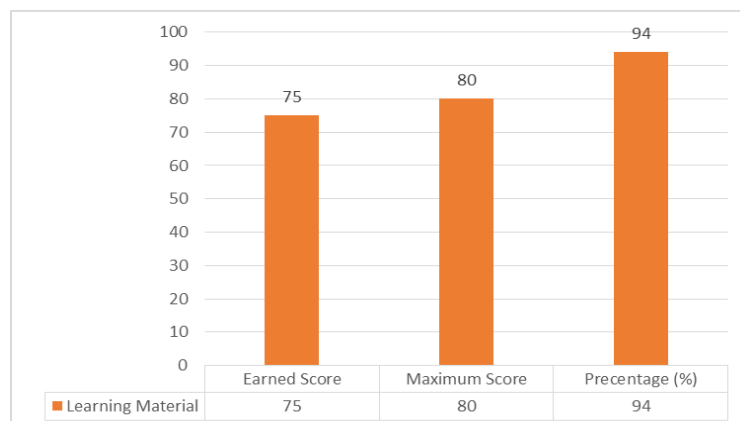
LEARNING EXPERT

Class A Questionnaire Lighting Effect Indicators, Subtitle, Figure 20 Statement

No	Name	Earned Score	Maximum Score	Percentage (%)	Category
1	Dr. Ikhsan	75	80	94%	Very Decent

Results Data "Development of Android-Based Sport Physiology Learning Devices" by Learning Experts

No	Aspects Assessed	Earned Score	Maximum Score	Percentage (%)	Category
1	Learning Material	75	80	94%	Very Decent



From the distribution of statement questionnaires given to learning experts with physiology material and videos of physiology material and videos of learning physiology material, 94% were declared very decent. From the indicators that have been given, the Android-based exercise physiology learning material is very decent to be used.

## Conclusion

### Small sample

From the distribution of statement questionnaires given to a small sample of 15 students with 18 statements, the results obtained from the indicators of exercise physiology learning material 76% with a decent category, for video display indicators of learning materials 81% with a very decent category. With the two indicators that have been tested, a total of 78% of the indicators are obtained in the very decent category to be used. From the distribution of the statement questionnaire given to one learning expert with 18 statements, it was obtained that the total indicator was 75% with a suitable category for use. From the distribution of the statement questionnaire given to a small sample of 15 students with 18 statements with both indicators that have been tested, the total indicator obtained is 86% with a very decent category to be used

From the distribution of the statement questionnaire given to one expert with 18 statements with both indicators that have been tested, the total indicator obtained is 83% with a very decent category to be used. From the distribution of the statement questionnaires given to a small sample of 15 students with 18 statements with both indicators that have been tested, the total indicator obtained is 84% with a very decent category to be used. From the distribution of the statement questionnaire given to one learning expert with 20 statements obtained with the two indicators that have been tested, the total indicator obtained is 84% with a very decent category to be used.

### Big sample

From the distribution of the questionnaire statements given to a large sample with physiology material and videos of physiology material obtained from two indicators that have been given an assessment, 91% is very appropriate so that the android-based exercise physiology learning material is very decent category to be used. From the distribution of the questionnaire statements given to the physiology material experts, 94% of the indicators that have been given android-based exercise physiology learning materials are very decent category to be used. From the distribution of the statement questionnaire given to large groups of the total of the two indicators, 91%, it is very decent category to be used. From the distribution of statement questionnaires given to learning media experts with physiology material and videos of physiology material and videos of learning physiology material obtained 97%. From the indicators that have been given the android-based exercise physiology learning material is very decent category to be used. From the distribution of the statement questionnaire given to a large sample of class A and B with physiology material. Of the three indicators that have been assessed, 91% is very appropriate so that the android-based exercise physiology learning material is very decent category to be used. From the distribution of statement questionnaires given to learning experts with physiology material and videos of physiology material and videos of learning physiology material, 94% were declared very decent. From the indicators that have been given, the Android-based exercise physiology learning material is very decent category to be used.

## Recommendation

From small group trials, material experts, media experts and learning experts, it was stated that android-based exercise physiology learning could be carried out and continued to large groups. From the large group trial, material experts, media experts and learning experts are very decent category to be used, so

that android-based exercise physiology learning can be applied in the health and recreation physical education study program, Faculty of Sports Science, Medan State University. For other researchers, they can continue this research with other developments.

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