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Problem-Based Learning Model Supported Phydia (PBL-Phydia) to Improve ICT Abilities

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ABSTRACT

This research is motivated by the low level of physics learning activity using multimedia technology. This research aims to develop problem-based physics lectures supported by physics multimedia android (PBL-Phydia) to improve students' ICT skills. The research method used is the (R&D) method which refers to the ADDIE model. Subjects in the experimental class as a treatment class used Phydia as many as 17 students and the control class as a comparison class used PBL without the support of Phydia as many as 17 students. The results of the research have succeeded in developing a problem-based physics lecture design supported by Phydia with the characteristic of having a syntax consisting of five phases, and in each phase, there are independent learning activities with Phydia. The five phases are as follows: (1) Student orientation towards the problem; (2) Organizing students to study; (3) Independent and group investigations; (4) Develop and display artifacts and presentations, (5) Analyze and evaluate the problem-solving process on five lecture materials/topics related to physics. The test results show that Phydia is better able to improve ICT abilities.

Keywords: Problem-based physics learning, physics multimedia android, ICT ability

INTRODUCTION

The progress of education in Indonesia is largely determined by the quality of educators, namely mastering skills (in leadership and teamwork), ability to adapt to new technologies and global challenges (cultural agility), and having the ability to entrepreneurship (entrepreneurship), including mastery of social entrepreneurship. Adoption of new technology into the industrial revolution 4.0 is also marked by the ability of Indonesian human resources to carry out various innovation breakthroughs, increase the ability to use information optimally, and expand access or networks (Bao & Koenig, 2019). The encouraging thing is that Indonesia is included in the category of countries that are ready to face the industrial revolution 4.0. This refers to the initial report of "The Preliminary 4IR Country Readiness Evaluation". Indonesia is said to be a potential candidate and ready to welcome the industrial revolution 4.0. In anticipation of this, Indonesia, which benefits from Foreign Direct Investment (FDI), continues to build infrastructure in the education sector (Dunleavy et. al, 2022; Hu et. al, 2021).

The modern era or the 21st century is experiencing very rapid development, both in the fields of technology, science, psychology, and the transformation of cultural values (Good et. al, 2019). This development ultimately also requires a transformation of the educational paradigm,

namely that modern era education is not enough to only emphasize the achievement of knowledge as a product, but must also emphasize various dimensions of skills through the application of technology. The Partnership for 21st Century Skills team formulated 4 (four) 21st century skills, namely critical thinking and problem solving, effective communication, collaboration, and creativity and innovation (Hua, 2010; Ince, 2018). These four 21st century skills are based on higher order thinking skills (HOTS) as very important educational goals and are the focus of the direction of educational development (Jalinus et. al, 2021).

One of the taxonomies of thinking that becomes a reference in learning is Bloom's cognitive taxonomy. In Bloom's taxonomy, it is formulated that there are 6 levels of thinking processes, namely remembering, understanding, applying, analyzing, evaluating, and creating (Liu & Pásztor, 2022). To meet the needs of the 21st century, the concepts of critical thinking skills and problem solving are at the level of higher order thinking skills (HOTS), namely analyzing, evaluating, and creating (Ma'Ruf et. al, 2019). Higher-order thinking skills include thinking processes of analyzing, evaluating and creating; and in order for a person to be able to carry out the thought process, he must have the ability to think logically, critically, and creatively, so that he is able to solve problems. Higher-order thinking has characteristics that are not algorithmic, complex, so that it cannot be seen from only one point of view, multi-solution, many alternatives with their respective advantages and disadvantages, requires consideration and interpretation, involves many criteria which are sometimes contradictory, often uncertain, demands self-regulation (self-regulation) in the thought process, gives birth to a new higher meaning, and describes hard work and serious mental processes occurring, for example in elaborating or deciding something, it is not enough just to have good knowledge (Ma'ruf et. al, 2019a).

The 21st century is marked by rapid technological advances, where lifestyles and ways of interacting with others experience changes towards digital technology. The 21st century is described as a period of transformation towards the era of information technology, this also affects the needs of the industrial world, especially the preparation of human resources that place more emphasis on knowledge, mobility, and collaboration Ma'ruf et. al, 2020b). The industrial world in the 21st century requires more human resources with knowledge and skills, especially in critical thinking skills, problem solving, and ICT skills. Therefore, education plays an important role in preparing human resources to face the challenges of modern life which are dominated by information technology. Education needs to make adaptations or changes that support the development of 21st century skills and ICT abilities (Mann et. al, 2021).

21st century learning also requires teachers to be more critical and creative in utilizing innovative learning media. The development of information and communication technology gave birth to various technological products that can be used in the learning process, such as digital applications that are easy to use, so that the use of ICT in learning needs to be increased (Nakpong & Chanchalor, 2019).

The curriculum changes made by the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia in 2020 regarding the implementation of the Independent Curriculum must be applied to all tertiary institutions in Indonesia. This new curriculum is a breakthrough to support Indonesia's sustainable development (Nurtanto et. al, 2020). Students need to be given the opportunity to develop creativity, capacity, personality and independence in developing insight and competence themselves through real experiences and dynamics in the field such as ability requirements, real problems, social interaction, collaboration, self-management,

performance demands, targets and achievements. Through the implementation of this new curriculum, students are prepared to become true learners who are more flexible and adaptive in facing the challenges of their time. Therefore, the learning model directed through the independent curriculum is a project-based learning model and a case-based learning model (Ogunwolu et. al, 2018). Case based learning is an implementation of problem based learning.

Analysis of physics learning outcomes that integrate interactive multimedia is very good and can help increase student learning activities (Omiles et. al, 2020). In addition, the benefits of multimedia learning can help students' meta-analysis skills, which are mostly based on laboratory experiments (Serevina et. al, 2018).

Physics learning as part of science education has a central role in the development of 21st century educational concept-oriented learning. Understanding and experience of students in learning physics can be obtained through the teaching and learning process starting from what is learned to how to learn it. What is learned is related to the view of physics as a product, and how it is learned is related to physics as a process (Sheeba & Begum, 2018).

The ability to solve problems is needed in order to prepare students to face global competition, so that students will be better prepared to compete and participate in the world of work. Therefore, various efforts need to be made to improve problem solving skills in students. These efforts include improving students' abilities related to their cognitive abilities, as well as improving teaching quality by improving teaching methods and characteristics (Thees et. al, 2020). Thus it is hoped that students will become individuals who are more prepared when facing problems, especially if they have directly implemented their knowledge in society.

Problem solving is a complex process that is important for students in learning physics. Problems in physics are usually related to the context of everyday life. Problem solving involves finding the right way to achieve a goal. The problems given can be in the form of story problems, problems related to making decisions, problems related to resolution and diagnosis, performance strategies, analyzing problems, and designing problem solutions. Problem solving skills assist students in solving problems based on relevant theories and concepts. In the process of solving problems students will gain a deep understanding of the topic area, construct knowledge, new understandings and be able to make decisions (Theasy et. al, 2018).

To find out the problems experienced by prospective physics teacher students in basic physics courses, an initial observation was made by giving a questionnaire to 39 students at a private university in South Sulawesi. The result is that 84.6% of students tend to memorize each given formula without understanding the physical meaning of each of these formulas, and only 15.4% of students are able to carry out the thought process of solving problems well (Velly, 2021). In understanding basic physics material students more often receive material and equations without carrying out the process of self-discovery of a physics concept. If this problem persists in learning basic physics I, there will be a failure to understand a concept which will have an impact on the inability to solve problems (Vignal & Wilcox, 2022).

This is in line with the results of several studies on basic physics, namely that many basic physics concepts are mathematical in nature, contain many abstract concepts, are based on principles, and state processes and cycles. These things affect the ability of students to understand the material, frustration builds mental activity, is boring, so that it has a negative impact on learning outcomes. This view is supported by a number of research results related to students' difficulties understanding basic physics material including: Many students have difficulty understanding basic physics concepts. They experience misconceptions

about motion, force, and energy (Walsh et. al, 2019). Students are not able to integrate basic physics concepts in complex phenomena. Students experienced difficulties in mapping abstract concepts. Students had difficulty visualizing abstract basic physics concepts. These results indicate that students' difficulties in understanding basic physics concepts have become a global phenomenon. The use of Android-based technology can facilitate student-centered learning. Student-centered learning designed based on constructivist theory can develop critical thinking skills and problem solving skills (Zorluoğlu & Güven, 2020).

It is hoped that university graduates, especially prospective physics teachers, have critical thinking skills, problem solving and ICT skills that are not in line with the reality in physics education study programs in Indonesia. The gap between the skills needed by prospective physics teacher students in the world of work such as critical thinking, problem solving and ICT skills and the skills learned in college is still a problem. Observations on the learning process show that lectures still apply traditional learning, namely the dominant use of the lecturing method (teacher-centered) which has been proven to fail in producing quality alumni with the skills needed in the workplace and in everyday life.

This discrepancy problem also occurs in basic physics courses which form the basis for subsequent courses. Prospective physics teachers are expected to master physics material which includes basic physics, classical mechanics, magnetic electricity, thermodynamics, optical waves, and modern physics. Basic physics is vital for physics education students. This is because basic physics is the basis for advanced courses and contains concepts whose level of difficulty is not much different from the high school level. Physics education research shows that students can pass basic physics courses, in most cases with good grades, but still have very weak understanding of concepts, principles, and the relationships between principles.

Teaching problem-solving skills is still difficult for lecturers. Even though something is difficult, it still has to be taught because it is one of the important factors in learning physics, especially basic physics. Problem-based learning, students are better at choosing the right solution to a problem. Similar to teaching problem solving skills, teaching critical thinking is not an easy thing. Teaching higher-order thinking strategies, confronting real-world problems, open-ended discussions, and inquiry-oriented experiments are very good for developing critical thinking skills. The dialogue that takes place during interactions with colleagues shows an increase in critical thinking skills.

In tertiary institutions, especially for prospective physics teacher students, multimedia development is urgently needed. The interactive multimedia prepared for physics lectures at universities is the best way to provide a variety of media, and can clearly show phenomena that are difficult to display with other media. Therefore, it is very important to increase research on physics learning multimedia technology at the university level, focus and strengthen the combination of multimedia and learning advantages, so as to improve the quality of physics learning.

Various studies related to the use of interactive multimedia in learning are seen as helping and facilitating the improvement of critical thinking skills, problem solving skills, and ICT skills. One of the advantages of interactive multimedia is that it can visualize and simplify basic physics abstract concepts. Abstract concepts are easier to understand when using multimedia, and interactive software helps students understand abstract concepts in the material of force and motion. The use of interactive simulations will improve students' mental models. To improve students' ability to integrate basic physics concepts into complex phenomena and increase understanding, the use of interactive

multimedia with simulations, films, diagrams, graphs, animations, and sound plays an important role to help visualize and simplify abstract concepts that are difficult for students to understand. In addition, interactive multimedia gives students the opportunity to study material at any time, responds quickly, gets used to thinking critically, and encourages students' curiosity to carry out investigations.

The results of research from 2018 to 2022, namely in several journals related to the use of information and communication technology in basic physics lectures, state that research trends can be grouped into three groups, namely: 1) use of multimedia to assist students in solving problems; 2) the use of simulation and multimedia programs to increase student interactivity; 3) the use of interactive multimedia to increase the ability to reflect and apply scientific ideas. Based on these results, no one has developed interactive multimedia in a comprehensive manner which includes theory, animation, video, and interactive exercises aimed at improving critical thinking skills, problem solving abilities, and ICT abilities for prospective physics teachers.

The research design for testing and implementing the use of problem-based basic physics lecture design products supported by interactive multimedia with the Android platform was carried out using a quasi-experimental method with a pretest-posttest design. With this design, the experimental class before and after was given treatment (intervention) in the form of problem-based basic physics lectures supported by interactive multimedia with the developed Android platform, while the activity control class used PBL learning without the support of interactive multimedia with the Android platform.

MATERIALS & METHODS

The research method used in this study is the method Research and Development which refers to the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model is one of the most widely used models as a guide in designing effective learning in any environment, both online and offline. Each phase in the ADDIE model is interconnected and interacts with each other. Overall the stages in the ADDIE model are the 'Development' part of R & D, while the Analysis stage in the ADDIE model complements the 'Research' part of R & D.

Location of field trials and implementation of problem-based basic physics lecture products supported by phydia application at one of the private tertiary institutions in South Sulawesi. While the research subjects were first semester physics education students in the Physics Education Study Program. The number of samples in the field trial was 20 people in the field trial, while at the implementation stage the population was 17 people for the experimental class, and 17 people for the control class.

The research instrument used was a test ICT ability test related to basic physics learning uses phydia application, the form of the test uses multiple choice. ICT ability indicators used according to Griffin F are accessing ICT ability (phydia application).

Test for improving ICT abilities of students who receive problem-based basic physics lectures supported by phydia applications (PBL-Phydia) compared to students who receive problem-based basic physics lectures without the support of interactive multimedia with phydia application, performed using non-parametric statistics through the Mann-Whitney Test. The use of the Mann-Whitney Test (non-parametric statistics) is due to the small number of research samples, so that the data distribution is not close to normal.

RESULT

A well-presented results section coupled with a convincing discussion will definitely prove the novelty and importance of your study. It should provide a concise and precise description of the experimental

results, their interpretation, as well as the experimental conclusions that can be drawn.

a. Results of the analysis phase

The form of needs analysis is carried out to support the development of problem-based basic physics lecture designs supported by interactive multimedia with the Android platform to improve ICT abilities as follows The level of need for the type of learning media obtained from data is that the highest level of need in a row is interactive multimedia (34.0%), video/simulation (32.9%), mobile learning (22.4%), and presentation material/power point (10.7%). In higher education, especially for prospective physics teacher students, multimedia development is very much needed, this is in line with research conducted by [43][44] which says that quality basic physics lectures at the college level namely by using various media such as audio-visual or interactive multimedia, so that students more easily understand basic physics concepts that are considered difficult. So that students can increase their basic physics learning outcomes. Therefore, it is very important to strengthen and increase the use of multimedia technology for basic physics in universities, by combining digital technology, android technology and other technologies to improve the quality of learning physics.

Data on the level of understanding of basic physics concepts at a private university in South Sulawesi Indonesia, it is known that students have difficulty understanding basic physics concepts at a very difficult level of 15.1%, difficult 14.8%, while at an easy level of 46, 6% and very easy 31.7%. With regard to the subject matter of basic physics lectures, the number of students who stated that it was very difficult focused mostly on heat (26.0%), rotation of rigid bodies (23.1%), elasticity and spring force (17.9%), currents and electrical circuits (15.4%). Meanwhile, at the difficult level, a lot of material is focused on rotation of rigid bodies (61.5%), vibrations and waves (59.0%), elasticity and spring force (59.0%), currents and electrical circuits (53.8%).

Basic physics learning has a central role in the development of 21st century educational concept-oriented learning. Student understanding and experience in basic physics learning can be obtained through the teaching and learning process starting from what is learned to how to learn it. What is learned is related to the view of basic physics as a product and how to learn it is related to basic physics as a process. The ideal demands of the basic physics lecture learning plan experience a gap with the actual situation of the basic physics lecture process. Learning outcomes are not in line with the learning process and student activities carried out in basic physics lectures. The gap problem is supported by data on student responses to a number of questions about the implementation of basic physics lectures and their impacts. Questionnaires were given to 20 students of the physics education study program at one of the Educating Institutions and Education Personnel in South Sulawesi class of 2018 who had attended basic physics courses.

The results of student responses regarding the implementation of basic physics lectures that have been carried out so far. Almost all students stated that learning basic physics was considered difficult to learn. This result is in line with research [34][35][36] which shows that most students think learning physics is difficult, complicated, and requires complex calculations, one of the basic reasons is because physics requires complex mathematics. Students may be able to take part in basic physics lessons, but in many cases students are able to get good grades, but they are still very low on concepts, principles and relationships between principles [35].

The main factor for students' difficulties in learning basic physics material is the provision of inappropriate learning strategies. The data shows that almost all students feel the need to apply different learning strategies for basic physics courses. This result is in accordance with the results

of observations in basic physics lectures that the delivery of material should be student-centered but in practice it is still teacher-centered learning, and even tends to be informative and mathematical. The learning strategy is still very monotonous as it is done now, there are not too many variations of the strategy given, the use of learning media is still not optimal. The results of preliminary observations in the process of basic physics lectures show that lectures still apply teacher-centered learning, which has proven to be less effective in improving student learning outcomes, and very low in aspects of 21st century skills such as critical thinking, problem solving and ICT abilities [36].

b. Results of the design stage

Lecture characteristics are the hallmark of one lecture with another lecture. The characteristics of the lectures need to be described clearly, in order to distinguish the lectures that are being developed from the existing lecture designs. This research attempts to develop a problem-based basic physics lecture design supported by phydia application (PBL-Phydia) which aims to improve ICT abilities. The product produced in this study is a problem-based basic physics lecture design supported by phydia application.

Furthermore, based on the foundations and aspects that build the basic physics lecture design of the PBL-Phydia, a problem-based design of the basic physics lecture stages is carried out supported by interactive multimedia with the Android platform. Lecture phases contain three core activities, namely preliminary activities, core activities and final activities. Preliminary activities aim to orient lectures that take place by being given problems or focusing students in carrying out lecture activities.

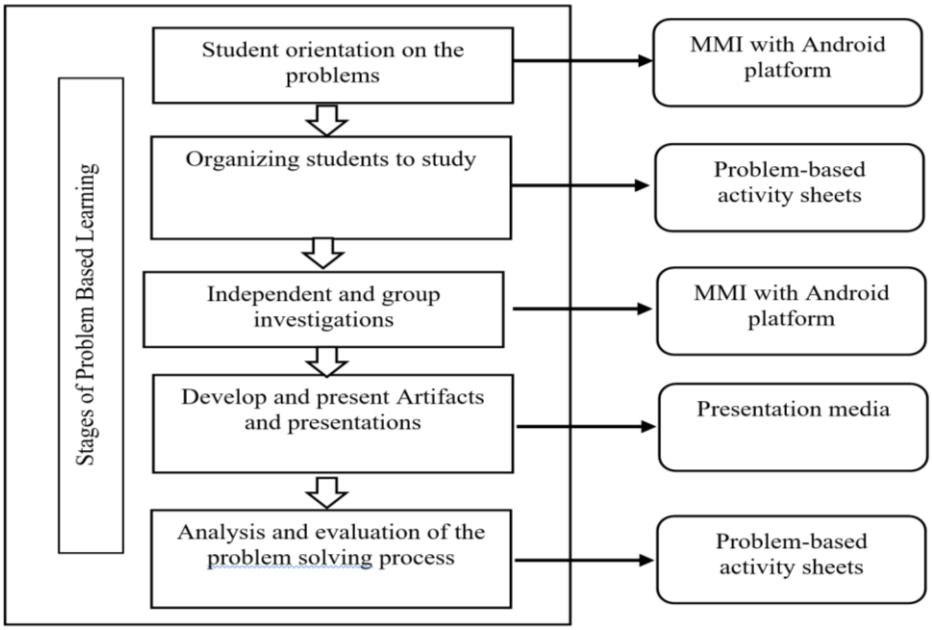

Fig 1. Preliminary design of a basic physics lecture with the PBL-Phydia

In PBL-Phydia, activities to focus students on the concepts to be studied are carried out by displaying problems related to concepts and relevant to everyday life supported by interactive multimedia with the Android platform, namely the Phydia application. Core activities, namely most of the activities carried out at this stage. The core lecture activities contain processes that are aligned with the lecture objectives. The aim of lectures is directed at improving ICT abilities so that the process of the core lecture activities is directed at ICT abilities.

The PBL-Phydia core activities are characterized by independent learning activities through phydia application in each phase with the aim of helping improve students' thinking skills. Lectures always end with a closing activity. This activity contains follow-up for strengthening and enrichment. The initial draft of the basic physics lecture design of the PBL-Phydia is as shown in Figure 1.

The problem-solving stages are supported by interactive multimedia with phydia application designed to refer to the problem-solving stages that have been developed so far. The general characteristics of the problem-solving stages developed so far include five stages, namely student orientation to problems, organizing students for learning, independent and group investigations, developing and displaying artifacts and presentations and ending with analysis and evaluation of the problem-solving process, where each phase is added to learning activities. independently using interactive multimedia with phydia application. Each stage of learning activities requires a connection from the use of interactive multimedia access services with phydia application to help students find more references for finding learning resources and others.

This multimedia application requires a minimum of 150 MB of free space, and after testing the application, data is obtained that not all types of cellphones and smartphones can be installed with this application. With the existence of interactive multimedia with phydia application, it can improve students' ICT abilities. This interactive multimedia with phydia application is equipped with a menu of teaching materials arranged with text, images, graphics and videos. Problem solving oriented student activity sheets. Menu critical thinking, problem solving and learning videos.

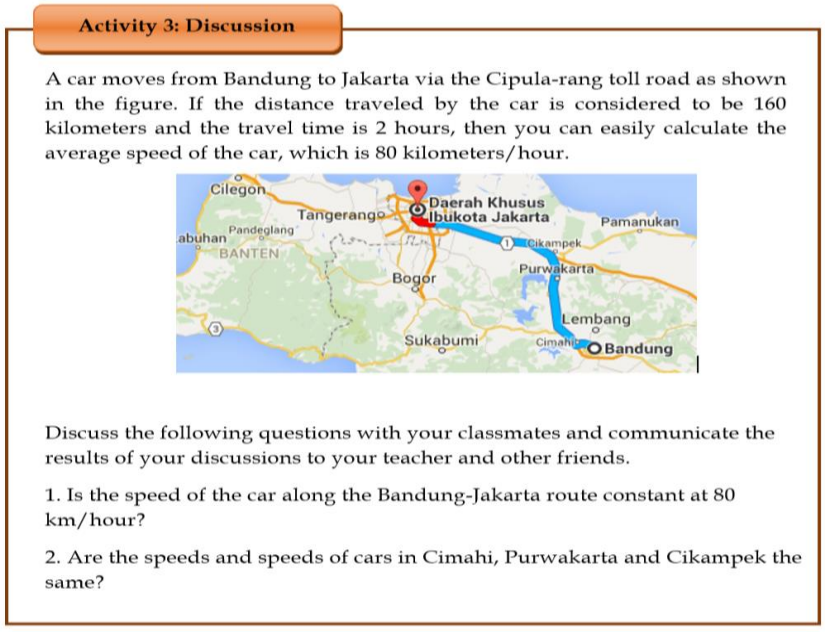

Fig 2. Display of teaching materials on phydia aplication

a. Results of the development stage

Android-based interactive multimedia is multimedia development that adapts to technological developments, where now Android technology development has been used in various fields including education. This Android technology is very helpful for students whose daily activities always use Android. Creating Android-based interactive multimedia for research using Smart Application Creator (SAC) software version 3.2.0.0. This software provides two versions, namely the Android version and the IOS version, but for this research the

Android version was chosen based on user needs, namely students still mostly use the Android version for learning.

This multimedia application requires a minimum of 150 MB of free space, and after testing the application, data was obtained that not all types of cellphones and smartphones can have this application installed. With this Android-based interactive multimedia, it can improve students' ICT abilities.

This Android-based interactive multimedia is equipped with a menu of teaching materials arranged with text, images, graphics and videos. Problem solving oriented student activity sheet. Critical thinking menu, problem solving and learning videos. The name of the multimedia created is Phydia Application, namely physics interactive multimedia.

Table 1. Results of expert assessment of Phydia applications

No	Assessment Components	Consideration		Notes
		In accordance (%)	It is not in accordance with (%)	
Material Aspect:				
1.	The material presented is systematic.	100	-	
2.	Accurate sentence structure and easy to understand language	100	-	
3.	The material is appropriate to the ability level of early semester students.	100	-	Can be enriched with transdisciplinary material (material that has concepts or principles related to its application in real life)
4.	The videos used are appropriate to the material	100	-	You can consider reconstructing the video presentation to make it more meaningful, easier to understand, inspiring and encouraging critical thinking
5.	The examples given are appropriate to the material.	100	-	
Media Aspect;				
6.	The text can be read well	100	-	Don't read too much on one screen, combine reading, images, animations, simulations, videos. If possible, there are quizzes or short essays that can evaluate students' abilities per section.
7.	Selection of background graphics	100	-	
8.	Text size and font.	100	-	In accordance with the notes above
9.	Colors and graphics	100	-	It's good, it's just that it should be made more interesting. You can consider adding color variations to the illustration to make the appearance more attractive to users.
10.	Supporting images	100	-	
11.	Supporting images	100	-	
12	Video presentation	100	-	
13.	The sound is heard clearly	67	33	Application files cannot be accessed properly by several types of cellphones
14.	Clarity of material description	100	-	
15.	Clarity of Instructions	100	-	
16.	Placement and use of buttons	100	-	
17.	Ease of use of media	67	33	

The results of the Android-based interactive multimedia assessment were carried out by three experts in basic physics and learning multimedia materials

to ensure that the multimedia that had been developed was in accordance with the objectives that had been formulated. The assessment results, suggestions from learning multimedia experts and improvement results are summarized in Table 1.

Based on the assessment results in table 1, overall Android-based interactive multimedia can be used for research by considering various suggestions and input from experts who examined it. One aspect that needs fundamental improvement in this multimedia is the use of existing sound, not too optimal, the appearance in general is good, but still too textual. The interactive aspect also needs to be added, especially in the illustration of example questions and the use of student activity sheets in the multimedia.

a. Improvement of ICT ability

Students' ICT abilities are measured using an ICT ability test. The ICT ability test consists of 10 questions which represent an indicator of ICT ability according to Grifin F, (2012) with the indicator being accessing ICT services (Android Based Interactive Multimedia). The ICT ability test was only given to the experimental class group, because only the experimental class used Android-based interactive multimedia. Figure 3 shows the distribution of students' ICT abilities test scores.

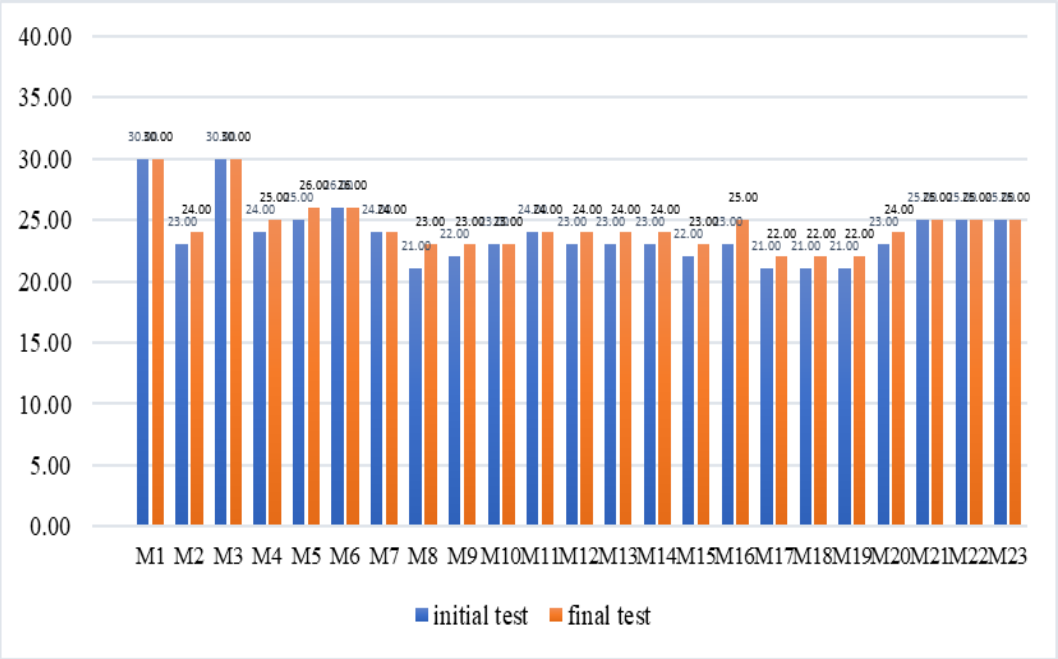

Fig. 3. Distribution of student ICT ability test scores

Based on Figure 10, the results of the student ICT ability test which are based on the use of Android-based interactive multimedia are overall very good. This can be seen from the initial test data which is almost the same as the final test results, where the use of Android-based interactive multimedia is very smooth and does not experience any obstacles either because technical problems or due to personal use.

DISCUSSION

This is different from the results obtained for ICT abilities, where overall from the aspects measured, the results show that students' ICT abilities are in the category of mastering independently. This is due to students' interest in Android-based interactive multimedia applications called Phydia Applications. Apart from that, it is also supported by the results of students' responses to the use of Android-based

interactive multimedia, the results of which were very good.

There was a positive increase in ICT abilities for the experimental class and control class because the program products developed were problem solving oriented using the Phydia Application, which was developed based on the problem solving stages of Arends, while the control class used the problem solving stages without using the Phydia Application. Because the aim of learning is to improve ICT abilities, learning using the Phydia application is one of the right learning media choices. According to (Yuliati et al., 2018) choosing the right learning media must consider the learning objectives. Problem-solving based learning offers the potential for students to learn and improve ICT abilities. The success of increasing ICT abilities is supported by research results which show that the use of learning using the Phydia application has a positive effect on the success of physics learning and can be used as an alternative media in physics learning (Ince, 2018).

Problem solving activities are the most important activities in the problem solving based learning process (Whitcomb et al., 2021). The series of problem-solving-based learning activities through the Phydia application does not expect students to just listen, take notes, then memorize the lesson material, but through the Phydia application students are required to actively think, communicate, search and process data, and finally draw conclusions.

The possible cause of increasing ICT abilities for experimental classes is the existence of case illustrations with the help of learning videos via the Phydia application. The results of other research show that students provide a positive view of the scaffolding approach in the learning process and that it is effective in improving ICT abilities. This is also supported by research results (Hua, 2010) that one of the key factors for the success of problem-solving oriented learning assisted by Android media is the effective use of media.

The response from students and lecturers to the basic physics lectures assisted by the Phydia application was positive. On average, students responded agreeing that lectures assisted by the Phydia application can improve ICT abilities.

Based on the analysis of the findings of limited trials and the implementation of basic physics lectures assisted by Phydia, the application has several advantages. The advantages of basic physics lectures with the help of the Phydia application include that it can make learning more meaningful, because students feel that what they learn, in this case the problem given, is relevant to their lives. Apart from being able to train students to solve problems, the learning process assisted by the Phydia application can also train students in their ICT abilities. Can learn many concepts in solving problems. Students who do not yet have the interest or confidence that the problem being studied is difficult to solve, can reflect on their own learning, why students do not believe the problem can be solved, what concepts they do not know and what material must be studied to make it easier to find solutions to problems through phydia app.

CONCLUSION

Based on the research results, several conclusions can be drawn, namely that a basic physics lecture program has been successfully developed using the phydia application with the characteristics of having a syntax consisting of the following four phases: (1) Student orientation towards the problem; (2) Organizing students to study; (3) Independent and group investigations; (4) Analysis and evaluation of the problem solving process on 5 lecture materials/topics related to basic physics, namely: Two-Dimensional Motion, Dynamics, Static Fluids, Dynamic Fluids and Heat. Phydia application was developed to help students improve their ICT abilities. 2. All lecture activities at each stage of the lecture program which are oriented towards problem solving with the help of the Phydia

application have been carried out by lecturers and students. 3. The effectiveness of using the Phydia application in improving ICT abilities is in the independent mastery category. 4. Lecturers and students generally gave a positive response to the implementation of problem solving-oriented basic physics lectures using the phydia application.

Declaration by Authors

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