MUDIR (Jurnal Manajemen Pendidikan) P-ISSN : 2655-9331 E-ISSN : 2657-2230
Avalaible online at: **https://ejournal.insud.ac.id/index.php/mpi/index**
Volume 5, Nomor 1, Januari 2023 | DOI: https://doi.org/10.55352/mudir

THE ANALYSIS OF EFFECTIVENESS OF MOBILE LEARNING MEDIA USAGE IN TRAIN STUDENTS' CRITICAL THINKING SKILLS

*[1]Yoseb Boari, [2]Rissa Megavitry, [3]Petrus Jacob Pattiasina,
[4]Hasbi Taobah Ramdani, [5]Haris Munandar

[1]Universitas Ottow Geissler Papua, [2]Universitas Negeri Makassar,
[3]Universitas Pattimura Ambon,
[4]STIKes Karsa Husada Garut, [5]Universitas Negeri Gorontalo

Email: *[1]yobo.uogp@gmail.com

Abstrak: *Tujuan dari penelitian ini adalah untuk menyediakan materi pembelajaran rigid body equilibrium dan rotational dynamics untuk perangkat mobile menggunakan App Inventor yang layak, efisien, dan dapat digunakan serta dapat meningkatkan kemampuan berpikir kritis siswa. Penelitian ini menggunakan model pengembangan 4-D sebagai metodologi penelitiannya, dengan hanya tahap pengembangan yang termasuk dalam langkah-langkah mendefinisikan, mendesain, mengembangkan, dan menyebarluaskan. Siswa di kelas dijadikan sebagai subjek penelitian. Tes dan nontes (kuesioner) adalah jenis instrumen yang digunakan. Instrumen tes diberikan kepada 30 siswa, dan angket penilaian diberikan kepada ahli (desain pembelajaran, bahasa, media, dan materi), siswa (uji coba terbatas), dan dua orang guru fisika. Media yang dihasilkan dinilai layak oleh ahli (rancangan pembelajaran, bahasa, media, dan materi) dan efektif untuk melatih keterampilan berpikir kritis dengan nilai N-gain 0,49 kategori sedang dan angket efektivitas pendidik dengan persentase 86% sangat kategori efektif. Siswa menilai kepraktisan materi mobile learning memanfaatkan App Inventor sebesar 78,5%, sedangkan guru menilainya sebesar 92%.*
Kata kunci: media mobile learning, berpikir kritis, siswa, media

Abstract: The goal of this study is to provide rigid body equilibrium and rotational dynamics learning materials for mobile devices using App Inventor that are viable, efficient, and usable and that can enhance students' critical thinking abilities. This study used a 4-D development model as its research methodology, with just the development stage included in the steps of define, design, develop, and disseminate. Students in the class served as the study's subjects. Tests and non-tests (questionnaires) are the types of instruments employed. Test instruments were given to 30 students, and assessment questionnaires were given to experts (learning design, language, media, and materials), students (limited trials), and two physics teachers. The resulting media were considered appropriate by experts (learning design, language, media, and materials) and effective in training critical thinking skills with an N-gain value of 0.49 in the medium category and an educator effectiveness questionnaire with a percentage of 86% very effective category. Students rate the practicality of mobile learning material utilizing App Inventor at 78.5%, while teachers rate it at 92%.
Keywords: mobile learning media, critical thinking, students, media

Introduction

We are currently living in the Industrial Revolution 4.0, in which information technology, communication, and technology advancements are accelerating quickly, particularly in Indonesia. In this era, digital use is also increasing sharply in various fields of economics, transportation, and education, and even in the future, it is predicted that all will use digital. Entering the current era of globalization makes it easier for us to get various pieces of information instantly from various parts of the world, but it is also impossible

for us to study and read all of this information (Pur. Resources that are reliable, creative, critical, think logically, and easily compete globally are needed in the current era. According to the emergence of the Industrial Revolution 4.0 in the twenty-first century, we must have 4C competencies, which include critical thinking, communication, collaboration, and creativity. Students are required to use knowledge and skills in a critical way, apply knowledge to an unfamiliar situation, analyze new ideas, communicate and collaborate, solve problems, and make decisions (Purwowidodo, 2018).

Developing critical thinking skills is a requirement of the twenty-first century for students in Indonesia, but mastering physics necessitates higher-level thinking skills rather than only memorization of facts. Higher-order thinking is a conscious and deliberate process used to analyse or evaluate information and knowledge with academic attitudes and abilities that inform beliefs and behaviours. Critical thinking skills are a part of this process. The 21st century has obstacles that must be overcome, such as the use of technology in the learning process and the development of critical thinking abilities. Results of the Trends International Mathematics and Science Study (TIMSS), which was conducted by the International Association for the Evaluation of Educational Achievement (IEA), a global organization that evaluates education, particularly in the sciences. With an average score of 379 out of 500 for the international average, Indonesia was ranked 44th out of 49 nations in 2015. From these results, Indonesia is at a low level where the knowledge aspect is higher in context than reasoning and application. High-level thinking is included in reasoning, while basic-level thinking skills are included in knowledge and application. Based on the 2015 TIMSS report, higher-order thinking skills are very low, and one of the higher-order thinking abilities is critical thinking (Darmaji, 2019).

Based on the results of a preliminary questionnaire and an interview with one of the teachers, it was found that students had difficulty analysing and understanding the forces acting on an object, such as a stationary object or one in a state of equilibrium. offline learning media, including projectors and whiteboards; meanwhile, online media Ministry of Religion e-learning, zoom meeting. The teacher gives the pupils reading assignments as the first step in the learning process (D. Herro, 2018). The teacher obtains the teaching materials through madrasa E-Learning from the ministry of religion. In the classroom, the instructor goes over the subject again and conducts a Q&A session. Although the given media must use a quota and is frequently limited by signals, it is nonetheless extremely interactive. Additionally, during the COVID-19 pandemic, students' critical thinking abilities declined, and their learning attitudes were low, which made it difficult for them to analyse and evaluate the content they had learned. The results of the preliminary questionnaire given to students in several schools revealed that 87% of students needed Android-based learning media that contained explanations of material, pictures, videos, sample questions, practice questions, and practicum. In addition, as many as 69% of students find it difficult to understand the concepts of rigid body equilibrium and rotational dynamics. This result is in line with the researcher's observation that students do not make use of Android. Besides that, many students complain about teaching materials that are not stored on one medium, and when they are about to face a student test, they have to look for materials that were previously given by the teacher (Facione, 1990).

This is consistent with the findings of an interview with one of the professors, who stated that pupils still struggle to understand physics, which contributes to their poor average scores, particularly during practice questions. Additionally, in physics classes, students frequently get bored and can only concentrate for 10 to 15 minutes at a time. This is because there aren't enough learning media resources to support teaching and learning activities, and lectures still only use whiteboard and Google Classroom materials when given online. In accordance with the information obtained in the preliminary test questionnaire, only 54% of children were interested in learning physics with the media that currently existed. In addition, the learning media delivered by the teacher only use blackboards and projectors, so it makes students bored, which results in a low ability to analyse and evaluate the information obtained. Inadequate learning media makes researchers want to develop Android-based mobile learning media (Abdullah, 2019).

According to previous research, Android-based mobile learning media can increase student learning independence with very valid, very practical, and very effective criteria used in physics lessons. The average valid score for these criteria is 92.12%, the average valid score for practicality in terms of content, presentation, benefits, and opportunities is 81.25%, and the average effectiveness score is 83.01%. Learning resources that are readily available anytime and anywhere are the driving force behind this study (Rizal, 2019). Besides that, the printed media used by teachers is still printed media, such as textbooks and printed modules. This is due to the limited understanding of educators to use it later and the limited time in teaching and learning activities in class, so a lot of material has not been conveyed. The weakness of this study is that there are no practicum activities and it only contains 2 KD. In line with research by previous researcher. A score of 84% places students' critical thinking abilities and the efficiency of learning material in the good category. In order to help

students develop their critical thinking abilities, this mobile learning platform can be utilized as an alternate learning medium (Ichsan, 2023).

In addition to students who lack the ability to analyse and evaluate the material obtained, students often complain of difficulties in learning physics, especially if mathematical questions are in line. A recent study found that students still rely heavily on their physics teachers since they struggle to grasp the subject, particularly when there are mathematic questions involved (Firdawati, 2021). A prior study found that while students have a hard time studying physics, their dependence on their lecturers is still very strong. One-way knowledge transfer makes learning physics classes boring and challenging to understand. It is challenging for teachers to innovate in the development of learning media due to a number of barriers, including the use of existing facilities, information in schools that does not support ideal physics learning, and the discrepancy between face-to-face time and the amount of material that must be studied. So that students may more easily learn physics information, it is vital to create a mobile learning medium that can solve these issues (Tannady, 2023). Students require the most up-to-date learning tools while still being curriculum-aligned and possessing the necessary competences in light of the issues raised above (Ennis, 1985). The significance of Android-based media for learning was cited by 89% of pupils. Mobile learning, a learning application for smartphone devices that is used for teaching and learning activities, is one of the media required in this situation. The demands of the modern world necessitate media innovation, and mobile learning may be used anytime, anywhere, and is more flexible and cost-effective. learning based on technology (Prameswari, 2018). The learning media that researchers will develop are mobile learning media on physics material, especially rotational dynamics and rigid body equilibrium material. Learning media that will be developed using App Inventor (Sugiyono, 2019). This is because App Inventor is easy and uses blocks in its approach; we don't need to master basic programming, coding, or other things related to technology and information; therefore, App Inventor is easy and can be accepted by anyone (Nugroho, 2023). This is also supported by student comments; as many as 69% of students believe that Android-based instructional material created with the MIT App Inventor have improved the learning experience. Mobile learning media utilizing App Inventor with 4D models (Define, (Design), (Development), and (Disseminate) are supported by the learning materials that the researcher will create.

Method

In this study, the method used was research and development (R&D). Of the several research and development (R&D) research models, one of them is the one developed by previous researcher, which consists of four procedures: defining at this stage, the researcher determines what product will be developed; making a product design that will be developed; developing a product and then testing its validity; and disseminating the product that has been tested. In this study, the instruments used were test and non-test instruments. The aim was to find out information on the feasibility, practicality, and effectiveness of the product being developed. The instruments used include the following: interview guidelines, preliminary study questionnaires, expert test questionnaires, and student and teacher response questionnaires.

Findings and Discussion

In a modern learning system like now, it is not only the teacher who acts as a messenger, but students also have a role as communicants; therefore, it is not surprising that there is two-way communication or multi-way communication. Therefore, learning media are needed to increase effectiveness in the teaching and learning process. This is in line with previous researcher opinion that learning media are materials, tools, or methods used during the teaching and learning process with the aim that the process of educative communicative interaction between teachers and students runs effectively and efficiently in accordance with learning objectives. According to researchers, learning media is a tool, method, and technique used to streamline communication and relationships between teachers and students in the educational and pedagogical process in schools. In choosing learning media, there are several things that must be considered: (1) the purpose of making the tool; (2) the people who use the media; (3) for whom the media is intended; and (4) the effectiveness of the media so that there are no detrimental effects. Media is both concrete in form (such as blackboards, books, and others) and abstract in nature (such as sound videos and simulations).

Using mobile learning applications is an efficient and effective way to convey information. In the era of globalization, the use of mobility is a necessity to increase the efficiency and effectiveness of operations, including learning. Currently, mobile learning device applications are growing rapidly. This development has had a major influence on various aspects of life, even the behaviour and activities of today's society. Mobile learning is a medium for learning. With increasingly rapid technological advances, mobile learning can be an alternative for media in the education sector, providing equal access to educational information, quality

learning content in the form of text or video images, and so on, to facilitate the delivery of material. The mobile device in question is an Android-based smartphone. Mobile learning can be classified into four categories: techno-centric, e-learning focused, formal education instruments, and student-centred learning. Mobile devices are used as a learning tool in mobile learning. The phrase "pocket mobile learning" refers to the use of technology and portable devices for learning, including PDAs, cell phones, laptops, and tablets. The management of learning on the go using mobile technology is known as mobile learning.

Mobile learning is defined as learning in multiple contexts through social interaction and content using electronic devices. This device can be in the form of a smartphone, tablet, or laptop, using the network to get various types of information easily. Mobile learning can be a strategy for enhancing learning so that students can occasionally increase their digital literacy, fluency, and mobile skills while using different learning materials. It makes an effort to pinpoint the key elements of mobile learning that can be effectively handled by a selection of tasks that can be translated into higher-level competencies. On the basis of these assertions, it can be said that mobile learning is an alternative form of instruction that makes use of information and communication tools like personal digital assistants (PDAs), cell phones, laptops, and tablets to make learning more effective and efficient.

Higher-order thinking is included into problem-solving when it is done methodically. In order to think well, one must have the ability to reflect on their own thought processes. Providing basic explanations (elementary clarification), developing fundamental abilities (basic support), coming to a conclusion (interference), providing more explanation (advanced clarification), and defining strategies and tactics (strategy and tactics) are the five components that make up critical thinking skills. Students' critical thinking abilities will be improved and directed more with the help of these five factors. These five areas are not explicitly taught to students as a whole, but they can be developed gradually starting at a young age so that students are better equipped with critical thinking abilities in higher education. There are different categories of thinking that include logical, analytical, systematic, critical, and creative thinking. What is done with the facts is what raises questions about higher-order thinking. Students must comprehend information, relate facts to one another, classify facts, manipulate facts, use facts in novel contexts, and apply facts to develop novel solutions to novel issues.

Critical thinking skills, in terms of difficulty level, are divided into two categories: basic thinking skills and complex thinking skills. Basic thinking skills are thinking processes that involve students' abilities to receive and memorize, whereas complex thinking skills are thinking processes that require the analysis of ideas so as to make new implications. Critical thinking is a thought process that involves making, applying, synthesizing, and evaluating information obtained through observation, experience, reflection, or communication as a basis for taking action. Critical thinking involves various cognitive skills, which include several processes including interpretation, analysis, evaluation, inference, explanation, and self-management. A nuanced learning environment for developing abilities will provide opportunities for students to interact through group work. The group work in question is in the form of forming small groups with the varying abilities of each student. The behaviour displayed when thinking can reveal a person's critical thinking abilities. Critical thinking interpretation is a skill. The ability of pupils to comprehend, clarify, and communicate the meaning of data or information is known as interpretation. Analysis, namely the capacity of pupils to recognize the connection between data utilized to express ideas and judgments. Evaluation, namely the capacity of pupils to verify the accuracy of the data used to communicate ideas or judgments, Inference, or the capacity to locate and gather the components required to arrive at a logical conclusion, explanation, or the capacity to provide justifications and make claims based on data, technique, and context. Self-regulation, or the capacity for an individual to control his or her thinking.

Based on the explanation of critical thinking skills, it can be formulated that critical thinking skills are in interpreting problems, analysing, testing the truth based on evidence, or evaluating information based on the knowledge and experience that have been obtained and being able to organize their way of thinking about their beliefs. The indicators of critical thinking skills that will be used in this study are critical thinking skills as follows: Interpreting, namely providing interpretation, categorizing, and explaining the meaning of the data contained in the problem Analysing, namely connecting data to solve problems. Inferring, namely, identifying and obtaining the elements needed to make a reasonable conclusion Evaluate, namely, investigate and test the truth of information based on the concept used. Explanation, namely explaining and stating the results of thinking based on evidence obtained from the critical thinking skills that have been carried out. Self-regulation, which confirms, corrects, and organizes the way of thinking about the reasons put forward.

The growth of the Industrial Revolution 4.0 provides the foundation for the demands of the twenty-first century. Critical thinking, communication, cooperation, and creativity are the four 4C qualities that

students must possess. For this reason, critical thinking is crucial for pupils. Results of TIMSS with a score of 379 out of 500, Indonesia ranks 44th out of 49 nations in the Trends International Mathematics and Science Study, which was conducted by the International Association for the Evaluation of Educational Achievement (IEA). This shows low reasoning ability and application, so that means students' critical thinking skills are also low because critical thinking skills include high-order thinking. Based on the results of interviews with two teachers, it can be concluded that the ability of physics is below standard, or it can be said that the average value of physics lessons, especially the rotational dynamics and rigid body equilibrium material, is below standard. In addition, it is said that students have difficulty analysing the forces acting on an object in the subject of Rotational Dynamics and Equilibrium of Rigid Bodies because analytical thinking skills and evaluating the material presented are needed.

Learning media in schools look inadequate, and there is no proper use of learning media in schools. Mobile learning or an Android-based learning application also do not exist. Blackboards are still frequently employed in direct learning, which makes students bored and makes it harder for them to absorb the material, particularly when it comes to material that requires analysis and assessment skills, which lowers students' critical thinking abilities. Researchers create mobile learning media using App Inventor to enhance students' critical thinking skills using the 4D development model (Define, Design, Develop, Disseminate), but this research only reaches the development stage. Mobile learning is one of the learning media that is interesting and easily accessible anywhere. To determine whether the created media is appropriate for usage by students, the media are then assessed by media experts, subject matter experts, and users.

Conclusion

Mobile learning media uses the App Inventor, which is effectively used in learning. This is demonstrated by the rise in the average N-gain value of 0.49 in the category of moderate students' overall critical thinking skills. According to the educators' effectiveness questionnaire, 86% of respondents fall into the highly effective category. The App Inventor, which is created specifically for learning, is used by mobile learning media. This practical test is based on 30 11th grade students and two teacher response questionnaires. The results of student responses to practical aspects received an assessment of 78.5%. A 92% rating was given to the teacher response questionnaire answers for the practicality component. Thus, it is evident that the mobile learning material created with App Inventor falls within the category of being really useful. Mobile learning media using App Inventor on materials on rigid body equilibrium and rotational dynamics can be further developed by implementing a comparison class so that the quality of this mobile learning media is truly tested in terms of its utilization, because in this study only the feasibility, practicality, and effectiveness of a limited test sample were tested. Media Mobile Learning uses App Inventor on materials with rigid body equilibrium and rotational dynamics, which are still low in the opinion of media experts. It is better for this media to be further improved in design and colour selection so that it is more pleasing to the eye. In the exercise menu, there is still no feedback for students; it is hoped that further feedback will be given, not just answers. This learning medium has not yet reached the dissemination stage; preferably, after implementation, it will be distributed to schools and teachers so that it can be used as a learning medium. At the time of learning, there are still many students who cannot install, especially on IOS. It is hoped that there will be development of this mobile learning medium that can be installed on IOS.

References

Abdullah, F. (2019). DIGITAL PHENOMENA IN THE INDUSTRIAL REVOLUTION ERA 4.0. *Jurnal Dimensi DKV Seni Rupa Dan Desain, 1, 4*.

D. Herro, e. a. (2018). Mobile learning: Perspectives on Practice and Policy. *IAP*.

Darmaji, e. a. (2019). Mobile learning in Higher Education for The Industrial Revolution 4.0: Perception and Response of Physics Practicum. *International Journal of Interactive Mobile Technologies (IJIM), 9, 13*.

Ennis, R. H. (1985). Logical Basic for Measuring Critical Thinking Skills. *Education Leadership, 43*.

Facione, P. A. (1990). Critical Thinking: A Statement of Expert Consensus for Purpose of Educational Assessment and Instruction. *The California Academic Press*.

Firdawati, R. M. (2021). Development of Mobile learning Media on Newton's Laws Using the Appy Pie Application. *Jurnal Penelitian Pendidikan IPA, 2, 7*.

Ichsan, I. T. (2023). Efforts to Build Nationalism Values to Vocational High School Students with The implementation of Character Education. *Jurnal Pendidikan dan Kewirausahaan, 11, 2*.

Nugroho, B. S. (2023). Role of Work Experience, Work Motivation and Educational Background on Teacher Performance at Vocational School. *Jurnal Pendidikan dan Kewirausahaan, 11, 2*.

Prameswari, S. W. (2018). INCULCATE CRITICAL THINKING SKILLS IN PRIMARY SCHOOLS. *Social, Humanities, and Educational Studies (SHEs): Conference Series, 1, 1*.

Purwowidodo, A. (2018). Design Development of Lectora Inspire Application-Based Mobile Learning Learning Models as Mindtools in Learning Technology Learning Processes. *Ta'allum: Jurnal Pendidikan Islam, 1, 6*.

Rizal, N. S. (2019). Physics-based learning media for mobile learning on the Android platform using the App Inventor application to increase student learning independence. *Natural Science Journal, 1, 5*.

Sugiyono. (2019). *Research & Development Methods.* Bandung: Alfabeta.

Tannady, H. &. (2023). The Influence of Organization Culture, Work Environment and Leadership On Performance of Fulltime Lecturer (Case Study of Private Higher Education Institution which Supported by Corporate). *Journal on Education, 5, 4*.