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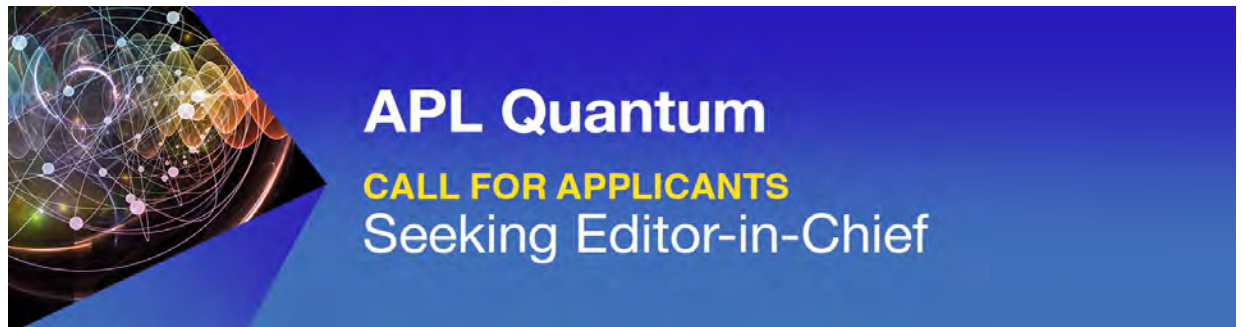
D. D. Panggabean, J. Sinuraya, Irfandi, et al.



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A blue banner with a quantum physics graphic on the left. The graphic shows a complex network of nodes and lines in various colors (green, yellow, orange, red) against a dark background. The text on the right is white and yellow.

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# Analysis of Teaching Material Needs in the Form of General Physics E-Modules Based on Scientific Approach

DD Panggabean<sup>a)</sup>, J Sinuraya<sup>b)</sup>, Irfandi<sup>c)</sup> and Y ButarButar<sup>d)</sup>

*Department of Physics, Medan State University, Jalan Willem Iskandar Pasar V, Medan 20221, Indonesia*

<sup>a)</sup> Corresponding author: [deo.panggabean@unimed.ac.id](mailto:deo.panggabean@unimed.ac.id)

<sup>b)</sup> [jurubahasa@unimed.ac.id](mailto:jurubahasa@unimed.ac.id)

<sup>c)</sup> [irfandi@unimed.ac.id](mailto:irfandi@unimed.ac.id)

<sup>d)</sup> [yosuabutarbutar81@gmail.com](mailto:yosuabutarbutar81@gmail.com)

**Abstract.** This study aims to develop a teaching material for general physics courses in the form of an electronic module based on a scientific approach. The initial step in developing this teaching material is the prelude study consisting literature and field studies. This research is a type of qualitative descriptive study. The used instruments to collect research data are in the form of a lecturer needs analysis questionnaire, and a student needs analysis questionnaire collected using google forms. Teaching materials have been developed in the form of Electronic Modules (E-Modules) which are presented with a scientific approach. E-Modules provide text, images, learning videos, and competency mastery evaluation tests that can be accessed offline and online to make it easier for students to learn the subject matter independently. Needs analysis was conducted to determine the learning resources used by lecturers and students and the learning resources needed by students. Based on the questionnaire of 28 students, the results are teaching materials which are generally used in the form of printed books and e-books, while the use of modules in the form of print modules and electronic modules is very rarely. Some students have difficulty in understanding general physics material, students feel that the available teaching materials are not helpful enough to build a whole understanding of the subject matter, students have difficulty in understanding physics concepts, have difficulty in understanding the derivation of formulas and have difficulty in solving problems. Students need teaching materials that can be used independently in the form of e-modules whose materials are presented with a scientific approach. The results of the analysis indicate the need to develop teaching materials in the form of General Physics E-Modules based on a scientific approach.

## INTRODUCTION

The *Corona Virus Disease 2019 (COVID-19)* pandemic has not yet ended. The COVID-19 pandemic has had an impact on various sectors of life such as the economy, social, including education. The impact of the Covid 19 pandemic in the field of education has been most felt by students in educational service providers, such as schools, non-formal educational institutions and universities, having to learn using online or online learning methods [1-2].

*Online learning* is learning that uses multimedia technology, virtual classes, CD ROMs, video *streaming*, voice messages, email and telephone conferences, animated *online text*, and *online video streaming* [3]. Online learning has the following characteristics: 1). independent learning, 2). Collaborative learning; 3). the formation of a learning community, 4). the use of *web media (websites)*, computer-based learning, virtual classes, and or digital classes, 5). Interactivity, independence, accessibility, and enrichment [4].

In online learning, the learning process also needs to consider some of the learning principles of connectivism [5]. The online learning process focuses on students, empowers students' autonomy and independence, and is based

on the principles of four main streams, namely behaviorism, cognitivism, constructivism, and connectivism. The online learning process can be categorized into two types, namely independent learning and guided learning [6].

In online learning, educators need to prepare various learning materials in the form of teaching materials and other appropriate online learning resources [7]. Teaching materials are essential and important learning resources needed to encourage efficient educators and improve student performance. With teaching materials make learning more interesting, practical, and realistic. Besides, the use of teaching materials in learning allows active participation of students and makes learning more effective [8].

Teaching materials are one of the factors that come from outside students that can strengthen student motivation. One component that must exist in the learning process is teaching materials. With the existence of teaching materials that are designed completely and adequately, it can affect the learning atmosphere so that the learning process that occurs is more optimal [9]. Well-designed teaching materials in which there are contents accompanied by interesting illustrations can stimulate students to utilize teaching materials as learning resources [10]. The objectives of preparing teaching materials are: 1) to assist students in obtaining alternative teaching materials in addition to textbooks which are sometimes difficult to understand; 2) facilitate teachers in carrying out learning; 3) provide teaching materials in accordance with the demands of the curriculum and the characteristics and social environment of students [11].

There are many types of teaching materials, some in the form of printed teaching materials, audio teaching materials, audio-visual teaching materials and interactive teaching materials. The form of teaching materials can be in the form of *handouts*, textbooks, print modules, cassettes, and *interactive compact disks* [12-13]. Teaching materials that can help realize quality learning are modules. The application of the module can condition learning activities to be more well-planned, independent, complete and clear [14]. The module is one of the learning resources designed systematically by educators with the aim of increasing effectiveness, efficiency, and increasing student interest in continuing to learn [15-16].

There are two types of modules, namely print modules and electronic modules (e-modules). Print modules are print-based learning media, while electronic modules are learning media in digital format that can display video, audio and others. Modules can make students more active in learning. In addition, in the module there are clear learning objectives so as to make students learn with direction in achieving the learning objectives that have been set [17].

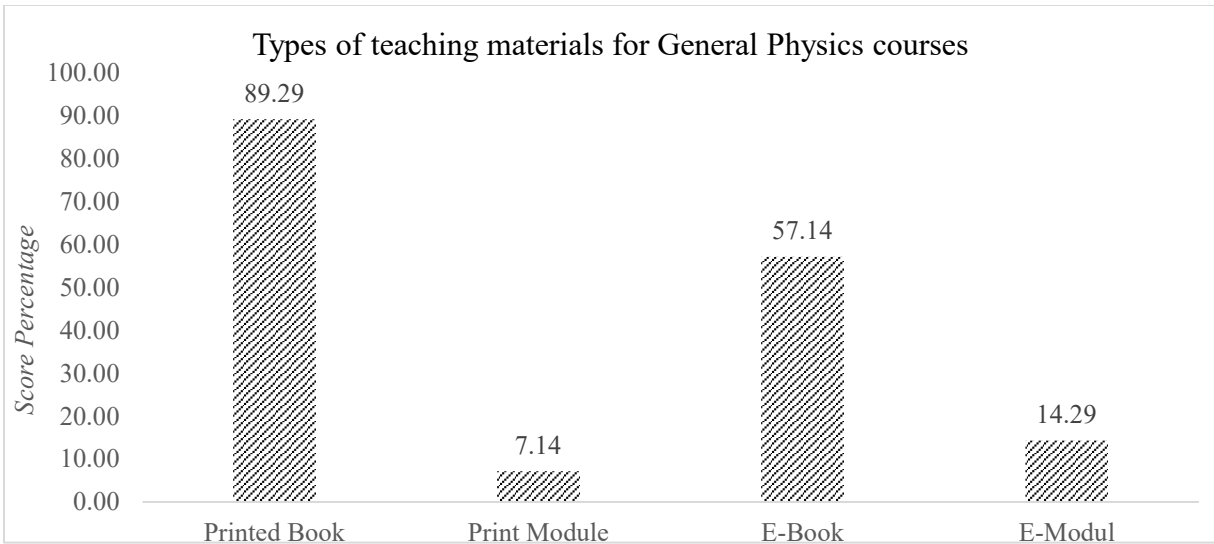
E-Modul is a module with an electronic format that is run on a computer/laptop or mobile phone. The use of this E-Module can be used without limiting the place or time [18]. To improve the implementation of online learning services for general physics courses, it is necessary to design teaching materials in the form of physics learning E-Modules whose material presentation is based on a scientific approach, so that students are able to study independently through teaching materials in preparing general physics teaching materials. E-Module General Physics Based on Scientific Approach is an electronic/digital module in which there is a presentation of general physics material based on the stages of learning with a scientific approach. The stages of the scientific approach include observing, asking, reasoning, trying, and communicating [19].

## METHOD

The purpose of this study is to describe the analysis of student needs for teaching materials for general physics courses in the form of electronic modules based on a scientific approach. This research method is descriptive qualitative. The research sample consisted of 28 second year students including several study programs in the mathematics and natural sciences faculty of Medan State University who had completed general physics courses. Data was collected using a questionnaire and then analyzed descriptively and qualitatively.

## RESULTS AND DISCUSSION

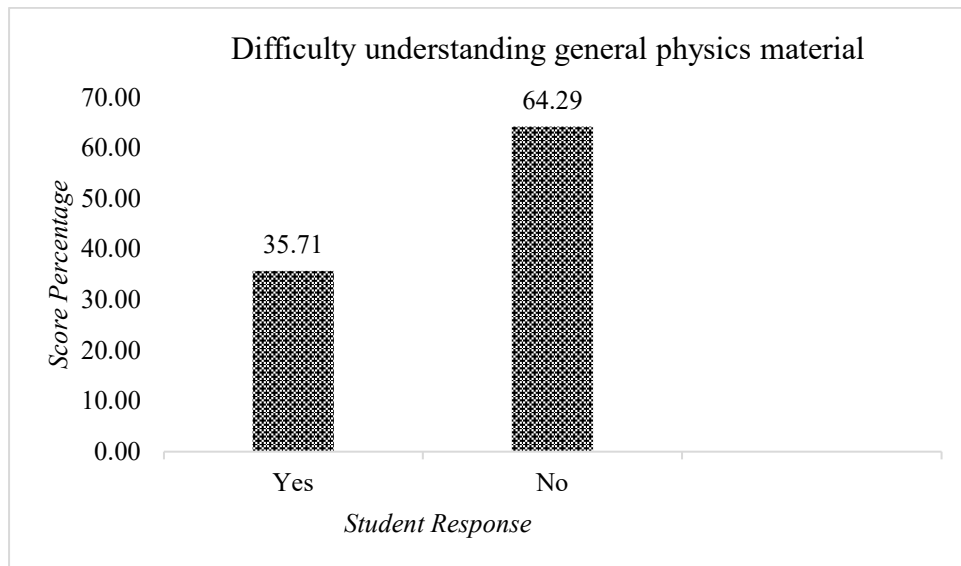
The results of the analysis of the questionnaire given to 28 students related to the teaching materials that are generally used in attending general physics lectures are printed books, printed modules, eBooks and e-modules. The percentage of each teaching material is as shown in Figure 1.



**FIGURE 1.** Types of Teaching Materials

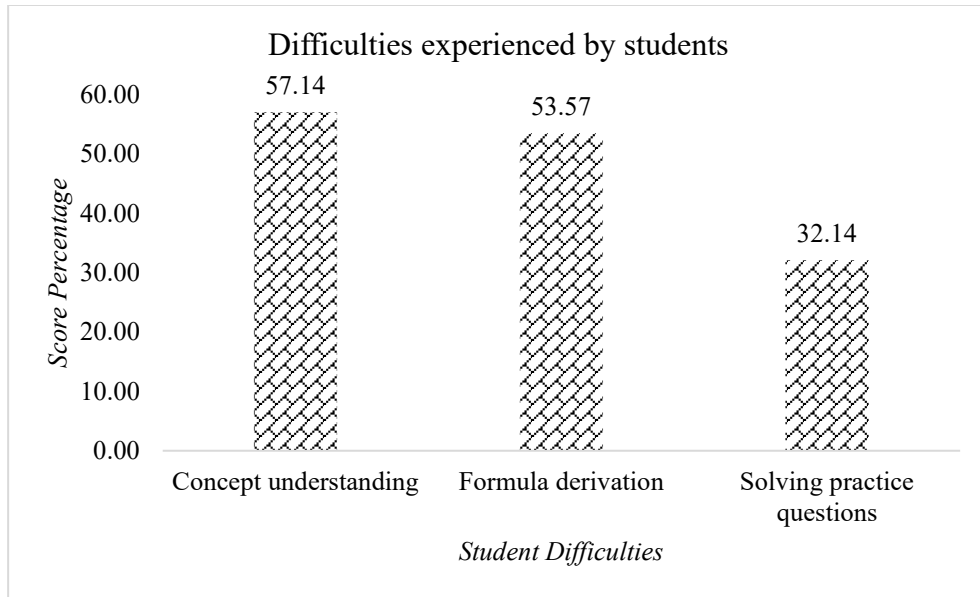
Based on Figure 1, it can be seen that the teaching materials commonly used by students are in the form of printed books and e-books, while the use of modules, both in the form of print modules and electronic modules, is still very small.

The results of the next analysis relate to the problems experienced by students in understanding general physics material. These results can be seen in Figure 2. There is a percentage of students some have difficulty in understanding general physics material of 35.71%



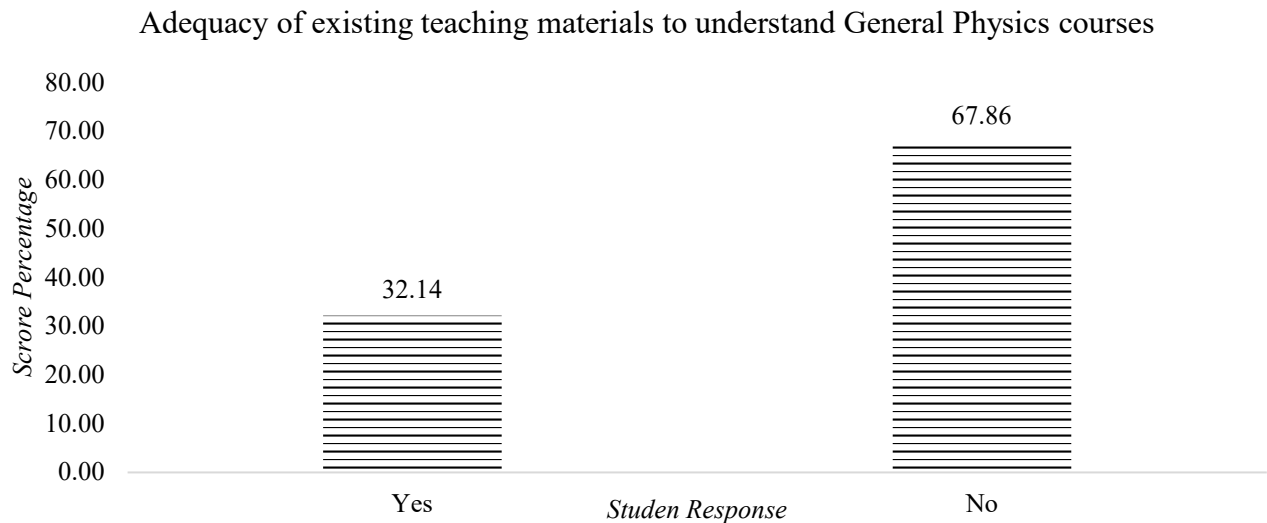
**FIGURE 2.** Difficulty understanding Material

Based on Figure 2, it can be seen that 35.71% of students have difficulty in understanding physics material in general physics courses. The difficulties experienced by students include difficulty understanding concepts (57.14%), difficulty in formulating formulas (53.57%) and difficulties in solving physics problems (32.14%) as shown in Figure 3.



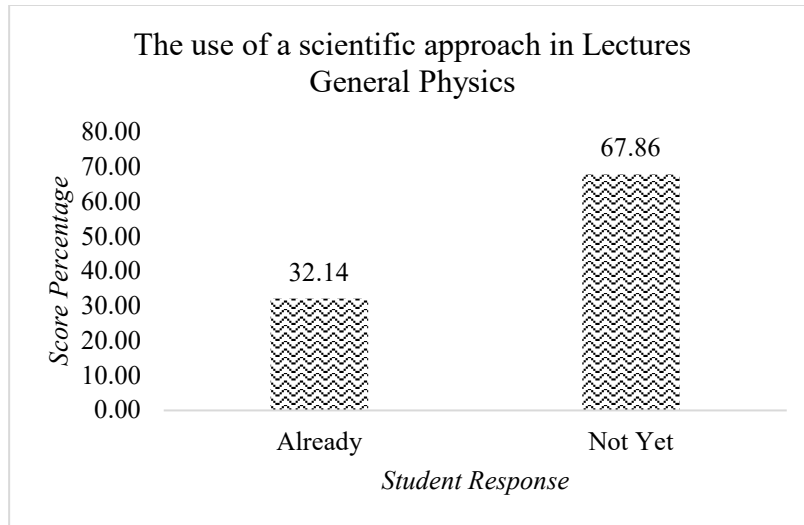
**FIGURE 3.** Difficulties experienced by students

One of the external factors that causes students to have difficulty understanding physics material in general physics courses is that the available teaching materials are still not enough to help students learn and understand general physics material easily and simply. This information was obtained through a questionnaire with a percentage of 67.86%, can be seen in Figure 4.



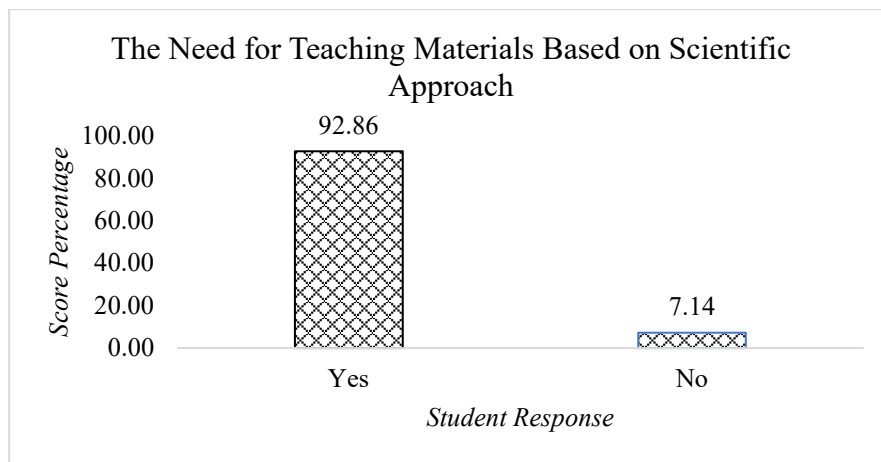
**FIGURE 4.** Adequacy of existing teaching materials

The results of the next student needs questionnaire analysis related to the use of the scientific approach in lectures are still minimal with a percentage of 32.14% as shown in Figure 5. The learning carried out still has not facilitated students to carry out scientific activities because learning during the covid 19 pandemic was carried out online and students did not can do practical work in the laboratory.



**FIGURE 5.** The use of a scientific approach

Online learning can still be carried out with a scientific approach if the teaching materials used can direct students to carry out the stages of the scientific approach through the worksheets available in the teaching materials [20]. Figure 6 shows that 92.86% of students need general physics teaching materials based on a scientific approach.



**FIGURE 6.** The Need for Teaching Materials Based on Scientific Approach

With the existence of teaching materials based on a scientific approach in general physics courses, it is expected to be able to overcome students' difficulties in understanding the material being studied. Several research results show a positive influence on the application of the scientific approach. Scientific approach in learning is effective in improving students' conceptual understanding [21]. The scientific approach invites students to directly infer existing problems in the form of problem formulations and hypotheses, a sense of care for the environment, curiosity, and a love of reading [22]. Through the application of a scientific approach will help students solve problems in the form of tests or non-tests [23].

## CONCLUSION

Based on the results of the research that has been done, it can be concluded from several indicators of the analysis of the needs for student teaching materials in the form of General Physics e-modules based on the scientific approach.

1. It shows that the teaching materials used by students in general physics lectures are mostly in the form of printed books, print modules, e-books, but the use of e-modules is still very little.
2. Some students have difficulty understanding general physics material related to understanding concepts, formulating formulas, and solving physics problems using available general physics teaching materials because according to students these teaching materials are not helpful enough to understand the material being studied.
3. This difficulty can be overcome by applying a scientific approach in studying general physics material, so that general physics teaching materials are needed in the form of an electronic module with the presentation of material based on a scientific approach that has stages of observing, asking questions, gathering information, associating, and communicating.

## REFERENCES

1. M. Siahaan, Impact of the Covid-19 Pandemic on the World of Education**20(2)**, (2020).
2. C. Adhetya, Journal of Islamic Education**1(1)**, pp. 123-140 (2020).
3. K. Thorne, *Blended Learning: How to Integrate Online & Traditional Learning* (VA: Kogan Page Limited, London & Sterling, 2003).
4. Ministry of Education and Culture, *Handbook of National Instructor Training/Learning Teacher Mentor* (Ministry of Education and Culture, Indonesia, 2016).
5. Connectivism and connective knowledge
6. SPADA, *Online Learning Process Guide 2019* (Ministry of RISTEKDIKTI, Indonesia, 2019).
7. Sumantri et al., *Online Learning Booklet* (Ministry of Education and Culture, Jakarta, 2020)
8. F. Asrizal and R. Sumarni, Journal of Exact Education**1(1)**, pp. 1-8 (2017).
9. A. Dimas, C. Cari, A. Suparmi, S. Sarwanto and J. Handhika, "Profile of Needs Analysis of Student Teaching Materials for Motion Dynamics in Basic Physics Courses". In *National Seminar on Physics and Its Applications*, Proceedings of SNFA1 (2017), pp. 42-45.
10. A.H. Hernawan, R. Susilana, S. Julacha and W. Sanjaya, *Curriculum development and learning* (Open University, Jakarta, 2008).
11. M.A. Soegiranto, *Reference for Writing Teaching Materials in the Form of Modules. Working Group for Curriculum and Supervision of Madrasah Development Center* (Ministry of Religion, East Nusa Tenggara, 2020).
12. A. Rahmi and H. Harmi, *MI Teaching Material Development* (Lp2 STAIN Curup, Curup, 2013).
13. A. Prastowo, *Creative Guide to Making Innovative Teaching Materials* (Diva Press, Yogyakarta, 2014).
14. Module preparation techniques.
15. I. Kurniasih and B. Sani, *Guidelines for making teaching materials for textbooks according to the 2013 Curriculum* (Pena's Word, Surabaya, 2014).
16. W.D. Dwiyoogo, *Learning Media* (Wineka Media, Malang, 2013).
17. L. Lasmiyati and I. Harta, Pythagoras: Journal of Mathematical Education**9(2)**, pp. 161-174 (2014).
18. I. Laili, Scientific Journal of Education and Learning**3(3)**, pp. 306-315 (2019).
19. Ministry of Education and Culture, *Teacher training materials for implementing the 2013 SD/MI Natural Sciences curriculum* (Human Resources Development Agency for Education, culture and education quality assurance, Jakarta, 2013).
20. J. Sinuraya, I. Wahyuni and D.D. Panggabean, In Journal of Physics: Conference Series**1428(1)**, pp. 012048 (2020).
21. N.P. Aulia, N. Fadiawati and L. Tania, Journal of Chemistry Education and Learning**6(1)**, pp. 130-144 (2017).
22. R. Fauziah, A.G. Abdullah and D.L. Hakim, *Invotec***9(2)**, (2013).
23. H. Sugiyarti, W. Sunarno and N.S. Aminah, *Inquiry***4(4)**, pp. 34-42 (2015).