Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika

http://jurnal.untirta.ac.id/index.php/Gravity

ISSN: 244-515x; e-ISSN: 2528-1976

Vol. 08, No. 01, April 2022, Page 34 - 40

Analysis of the needs basic physics teaching materials in industrial engineering major

Diana Ayu Rostikawati[1]*, Asep Saefullah[2]

[1]*Department of Primary School Teacher Education, Universitas Bina Bangsa, Indonesia*

[2]*Department of Physics Education, Universitas Sultan Ageng Tirtayasa, Indonesia*

**E-mail: diana.ar@binabangsa.ac.id*

(Received: 28 Februari 2022; Accepted: 04 April 2022; Published: 07 April 2022)

ABSTRACT

This study aims to analyze the needs of students for basic physics teaching materials in industrial engineering major. This study is an exploratory descriptive study with the subject of industrial engineering students who have taken basic physics courses. The sample used for this study was taken randomly with a total sample of 109 students. Data of study was obtained from filling out a questionnaire on the needs of teaching materials. The results of questionnaire analysis of the needs for teaching materials indicate that students want teaching materials that can make them active in learning, teaching materials whose contents begin with context in everyday life, can facilitate students to study in groups, and can improve skills in the world of work. As a follow-up to the results of questionnaire analysis, it is immediately necessary to develop basic physics teaching materials in industrial engineering major.

Keywords: Analysis of the needs, basic physics, teaching materials

DOI: 10.30870/gravity.v8i1.14865

INTRODUCTION

Education is a conscious and planned effort made by educators to students to carry out learning and training activities (Ali et al., 2012), that are able to make changes for students both in terms of thinking, behavior and nature (Gyimah-Brempong, 2011), to prepare life in the future (Sisdiknas, 2003). The learning process is related to the learning media. One of the effective and most frequently used learning media is teaching materials (Sari et al., 2022). The use of quality teaching materials can help teachers to deliver learning materials to the fullest (Saefullah et al., 2020). Teaching materials should be arranged by following certain

systematic rules, meaning the good teaching materials should have a compilation syntax that is adapted to purpose of teaching materials formation (Hamroev, 2019). In addition, teaching materials that are well designed and structured can also affect the success rate of learning process. For students, teaching materials have a role, namely: (1) students can learn independently; (2) students can study anytime and anywhere; (3) students can learn according to their own pace; (4) students can study according to the order of their own choosing; and (5) helping potentials to become independent learners (Djelita, 2011).

According to Prastowo (2011), teaching materials are grouped by form and how its work. Teaching materials according to their form are printed teaching materials, listening teaching materials, and hearing teaching materials. Teaching materials according to how its work consist of: non-projected teaching materials, projected teaching materials, audio teaching materials, video teaching materials, and computer media teaching materials (Mutiara et al., 2019). According to the times, teaching materials are not only in the form of books but can also be taken from the internet which can be in the form of journals, articles, and electronic books (e-books), making it easier for students to access various materials to be studied (Suyatna et al., 2018).

Educational institutions need to provide, develop, and utilize a variety of learning media and provide opportunities for students to learn according to their individual needs and learning styles so that the learning process is expected to be more efficient. The selection of teaching materials should be adjusted to the circumstances of students, the ability of available human resources, and the availability of facilities and infrastructure at educational institutions.

The Basic Physics course is a compulsory subject in the Industrial Engineering study program which forms the basis for students' understanding of the theoretical concepts of natural science and the application of the formulation of Basic Physics' laws (Reis, 2006). Through learning this course, students are expected to be able to apply the basics of Physics to their expertise in the field of Engineering, and understand the role of Physics as a basic science that can be applied in several fields of science (Meltzer, 2004). Basic Physics course requires students to understand the teaching material comprehensively. However, what happened in the lecture process based on observations, the majority of students assumed that the Basic Physics course was a difficult course to understand. Some of the obstacles felt by students include the presentation of the material on the existing Basic Physics material that is difficult to understand because the teaching materials are in the form of translated textbooks or foreign languages and the lack of student participation in class (Retnawati et al., 2018). Constraints felt by students have an impact on the learning process, students tend to be less active in learning. To overcome these problems, the course lecturers have made changes to the learning model so that students can be more active in the classroom (Saefullah et al., 2021). However, these efforts have not been fully able to overcome the problems that occur, because they can only overcome problems in terms of student activity in the classroom while efforts to overcome the limitations of teaching materials have not been resolved (Kaltakci-Gurel et al., 2016).

Based on this, teaching materials are needed that are able to support Basic Physics course.The purpose of this study was to determine the types of teaching materials that need to

be developed in the Basic Physics course at Bina Bangsa University through a questionnaire on the need for Basic Physics teaching materials. The results of this study are expected to provide information about the types of teaching materials that need to be developed to increase students' understanding and interest in studying Physics concepts in the Basic Physics course.

RESEARCH METHODS

This research is descriptive exploratory research. The research subjects are Industrial Engineering students who have or are contracting Basic Physics courses (Gehlert et al., 2009). A sample of 109 students was taken from 204 students who had taken basic physics courses in the industrial engineering study program in the 2020/2021 academic year. The data was collected using a teaching material needs analysis questionnaire. The research location is in the Industrial Engineering study program, Faculty of Science and Technology, Bina Bangsa University. The questionnaire for the analysis of the need for teaching materials for students contains multiple-choice questions (Nicol, 2007). The data analysis technique was carried out quantitatively descriptively, namely describing or explaining events that are happening at the present time in the form of meaningful numbers (Leech & Onwuegbuzie, 2008). There are 20 question items with yes and no answer choices then data processing is carried out by calculating the total answers to each question divided by the total number of students multiplied by 100%.

RESULTS AND DISCUSSION

Research on the analysis of the need for teaching materials that can support Basic Physics lectures is carried out using an instrument in the form of a questionnaire of teaching material needs. The results of the analysis of student needs for teaching materials for Basic Physics courses indicate that students need additional teaching materials to understand the materials and concepts of learning in these courses. This statement is based on the results of the analysis of the questionnaire for students which is shown in **Table 1**.

The analysis of teaching material needs is to find out teaching materials that are in accordance with demands of the curriculum by considering aspects of student needs, including according to characteristics and environment of students, helping students to obtain alternative teaching materials other than textbooks, and making it easier for educators in the learning process (Habibi et al., 2016). The results of the analysis of the questionnaire given to students showed some information, including more than 50% of students who thought that the teaching materials used in basic physics lectures were still limited, they also took a long time to understand the basic physics material in the existing teaching materials, so that they need basic physics teaching materials that are easy to understand (Bahri et al., 2018). In addition to the above information, the results of the analysis of the questionnaire also provide important additional information, namely more than 90% of students need basic physics teaching materials that can build on the knowledge they already have to acquire new knowledge, they also like teaching materials that can make them active in learning (Méndez-Coca & Slisko,

2013), teaching materials whose contents begin with contextual problems in everyday life (Méndez et al., 2008), then it is known that students need teaching materials that can facilitate group learning and teaching materials that can improve skills in the world of work (Adeyemo, 2009), so they are interested in using skill-based teaching materials for basic physics courses .

Table 1. Result of analysis teaching material needs questionnaire

No.	Statement	Percentage
1.	Students thought that the teaching materials used in basic physics lectures were still limited	More than 50%
2.	Students took a long time to understand the basic physics material in the existing teaching materials	More than 50%
3.	Students need basic physics teaching materials that are easy to understand	More than 50%
4.	Students need basic physics teaching materials that can build on the knowledge they already have to acquire new knowledge	More than 90%
5.	Students like teaching materials that can make them active in learning	More than 90%
6.	Students want teaching materials whose contents begin with contextual problems in everyday life	More than 90%
7.	Students need teaching materials that can facilitate in group learning	More than 90%
8.	Students teaching materials that can improve skills in the world of works	More than 90%
9.	Students expect basic physics teaching materials that contain pictures, detailed formula	More than 90%

As output for supporting lecturers, information is also obtained that models, methods, approaches and learning strategies need to be used in the lecture process for basic physics courses. Through the questionnaire, additional information was also explored regarding additional content and context that students are expected to include in the teaching materials. For content, students expect basic physics teaching materials that contain pictures, detailed formulas, and examples of questions in everyday life (Amézquita, 1976). As for context, students need criteria for teaching materials that contain material that is difficult to understand, material that has many formulas, and material that is relevant to everyday life (Septian et al., 2020).

After obtaining various information based on the analysis of the questionnaire on the need for teaching materials given to students, a conclusion can be drawn that it is necessary to develop basic physics teaching materials that can facilitate and meet student expectations. There are many forms of teaching materials, one of which is teaching materials in the form of printed books (Widalismana & Lestari, 2017). The printed book that will be developed is based on the results of the needs analysis of teaching materials in other words, the development of teaching materials will be based on the results of preliminary studies/research.

There are concepts that are often difficult for students to understand or educators find difficult to explain. This difficulty can also occur because the material is abstract and complicated. If the concept of learning is abstract, then the advantage of this textbook is that students can describe something abstract, for example by using pictures (photos) and schematics. Wulanzani (2016) states that teaching materials equipped with pictures can support learning and can also stimulate students to analyze and process information. Rotter (2006) states that the images contained in teaching materials have a positive effect on the ease of students to read and improve understanding. Likewise, complex material can be explained in a simple way, through research activities.

Research-based learning aims to create a learning process that leads to activities of analysis, synthesis, and evaluation as well as to improve the ability of students and lecturers in terms of assimilation and application of knowledge (Rivalina, 2017). Research results that are integrated into teaching materials are effectively used in learning because they are more applicable and meet contemporary elements (Peniati, 2012). This preliminary study/research on the analysis of the need for basic physics teaching materials is expected to be a solution to the problems of Industrial Engineering students in studying and applying physics knowledge in engineering.

CONCLUSION

Based on the research data regarding the analysis of student needs for basic physics teaching materials, it can be concluded that the teaching materials that need to be developed in the Basic Physics course in the Industrial Engineering study program, Bina Bangsa University is teaching materials in the form of printed books that can make students active in learning, teaching materials whose contents begin with context in everyday life, can facilitate students to study in groups, and can improve skills in the world of work.

REFERENCES

Adeyemo, S. A. (2009). Understanding and acquisition of entrepreneurial skills: A pedagogical re-orientation for classroom teacher in science education. *Journal of Turkish Science Education*, *6*(3), 57–65.

Ali, A., Ali, Z., & Naz, R. (2012). Study habits and education planning: A case study of comparison of private and public sector schools. *The Dialogue*, *7*(3), 309–318.

Amézquita, M. (1976). *Interactive pace approach to learning in physics: method and materials*.

Bahri, S., Rahayu, M., Supriyadi, R. S. W., Arsyad, M., & Arafah, K. (2018). *Implementation of Basic Physics I Computer-Based Teaching Material on Physics Education Students of Masamus University*.

Djelita, R. D. P. (2011). Pemilihan dan pengembangan bahan ajar mata pelajaran pendidikan kewarganegaraan sebagai tuntutan profesionalisme. *E-Jurnal Dinas Pendidikan Kota Surabaya*, *5*(1), 7.

Gehlert, S., Song, I. H., Chang, C.-H., & Hartlage, S. A. (2009). The prevalence of premenstrual dysphoric disorder in a randomly selected group of urban and rural women. *Psychological Medicine*, *39*(1), 129–136.

Gyimah-Brempong, K. (2011). Education and economic development in Africa. *African Development Review*, *23*(2), 219–236.

Habibi, M. W., Suarsini, E., & Amin, M. (2016). Pengembangan buku ajar matakuliah mikrobiologi dasar. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *1*(5), 890–900.

Hamroev, A. R. (2019). Modeling activities of teachers when designing creative activities of students. *European Journal of Research and Reflection in Educational Sciences*, *2019*.

Indonesia, U.-U. R. (2003). Sistem pendidikan nasional. *Jakarta: Direktorat Pendidikan Menengah Umum*.

Kaltakci-Gurel, D., Eryilmaz, A., & McDermott, L. C. (2016). Identifying pre-service physics teachers' misconceptions and conceptual difficulties about geometrical optics. *European Journal of Physics*, *37*(4), 45705.

Leech, N. L., & Onwuegbuzie, A. J. (2008). Qualitative data analysis: A compendium of techniques and a framework for selection for school psychology research and beyond. *School Psychology Quarterly*, *23*(4), 587.

Meltzer, D. E. (2004). Investigation of students' reasoning regarding heat, work, and the first law of thermodynamics in an introductory calculus-based general physics course. *American Journal of Physics*, *72*(11), 1432–1446.

Méndez-Coca, D., & Slisko, J. (2013). Software Socrative and smartphones as tools for implementation of basic processes of active physics learning in classroom: An initial feasibility study with prospective teachers. *European Journal of Physics Education*, *4*(2), 17–24.

Méndez, L., Lacasa, P., & Matusov, E. (2008). Transcending the zone of learning disability: learning in contexts for everyday life. *European Journal of Special Needs Education*, *23*(1), 63–73.

Mutiara, N., Suherman, A., & Saefullah, A. (2019). *Pengembangan Media Pembelajaran Fisika Simulasi Komputer Menggunakan Macromedia Flash 8.0 Pada Materi Alat Optik*.

Nicol, D. (2007). E-assessment by design: using multiple-choice tests to good effect. *Journal of Further and Higher Education*, *31*(1), 53–64.

Peniati, E., & others. (2012). Pengembangan modul mata kuliah strategi belajar mengajar IPA berbasis hasil penelitian pembelajaran. *Jurnal Pendidikan IPA Indonesia*, *1*(1).

Prastowo, A. (2011). *Panduan kreatif membuat bahan ajar inovatif*. Yogyakarta: DIVA press.

Reis, A. H. (2006). *Constructal theory: from engineering to physics, and how flow systems develop shape and structure*.

Retnawati, H., Arlinwibowo, J., Wulandari, N. F., & Pradani, R. G. (2018). Teachers' difficulties and strategies in physics teaching and learning that applying mathematics. *Journal of Baltic Science Education*, *17*(1), 120.

Rivalina, R. (2017). Strategi Pemanfaatan E-Learning dalam mengatasi keterbatasan jumlah dosen. *Kwangsan: Jurnal Teknologi Pendidikan*, *5*(2), 129–145.

Rotter, K. (2006). Creating instructional materials for all pupils: Try COLA. *Intervention in School and Clinic*, *41*(5), 273–282.

Saefullah, A, Guntara, Y., & Nulhakim, L. (2020). Reconstruction of Teaching Materials with Socio-Scientific Issues Context on Source of Energy Content. *Journal of Physics: Conference Series*, *1467*(1), 12022.

Saefullah, Asep, Guntara, Y., & Rostikawati, D. A. (2021). Implementation of the use of textbooks with the context of socio scientific issues on climate change materials and its impact on life to improve students' scientific literacy. *Gravity: Jurnal Ilmiah Penelitian Dan Pembelajaran Fisika*, *7*(2).

Sari, Y., Yustiana, S., Fironika, R., Ulia, N., Iasha, V., & Setiawan, B. (2022). The Design of Religious Value-Based Teaching Materials in Increasing Students' Learning Achievement Elementary School. *Jurnal Basicedu*, *6*(1), 1137–1144.

Septian, A., Sugiarni, R., & Monariska, E. (2020). The application of android-based geogebra on quadratic equations material toward mathematical creative thinking ability. *Al-Jabar: Jurnal Pendidikan Matematika*, *11*(2), 261–272.

Suyatna, A., Maulina, H., Rakhmawati, I., & Khasanah, R. A. N. (2018). Electronic versus printed book: A comparison study on the effectivity of senior high school physics book. *Jurnal Pendidikan IPA Indonesia*, *7*(4), 391–398.

Widalismana, M., & Lestari, N. D. (2017). Analisis Hasil Belajar Mahasiswa Menggunakan Media Cetak dengan Media Elektronik Pada Mata Kuliah Matematika Ekonomi di Universitas PGRI. *PINUS: Jurnal Penelitian Inovasi Pembelajaran*, *3*(1), 41–48.

Wulanzani, U. T., Lestari, U., & Syamsyuri, I. (2016). Hasil Validasi Buku Teks Matakuliah Bioteknologi Berbasis Bahan Alam Tanaman Pacing (Costus Speciosus Smith) sebagai Antifertilitas. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *1*(9), 1830–1835.