JPF | Volume 11 | Number 3 | 2023 | 257 - 266

p - ISSN: 2302-8939
e - ISSN: 2527-4015

Jurnal Pendidikan Fisika

https://journal.unismuh.ac.id/index.php/jpf

DOI: 10.26618/jpf.v11i3.10952

Needs Analysis for Physics E-Module Development on Work and Energy Materials in Senior High School

Endang Aldilla[1)*], Jufiani Ulfa [1)], Desnita [2)] , Usmeldi[2)]

[1)] *Master of Physics Education, Universitas Negeri Padang, Padang, 25132, Indonesia*
[2)] *Department of Physics Education, Universitas Negeri Padang, Padang, 25132, Indonesia*

**Corresponding author: endangaldilla09@gmail.com*

Received: May 30, 2023; Accepted: July 10, 2023; Published: August 19, 2023

Abstract *– In today's developments, the role of educators is not only needed in terms of sharing knowledge with students but also in preparing teaching media and materials that can help accelerate the delivery of material. The purpose of this study was to explore the needs analysis in developing physics e-modules on work and energy material for class X Senior High School. This study employed surveys under quantitative and qualitative approaches. There were 153 students involved in this study. The quantitative data were collected through learning resources and learning media instruments, while qualitative data were collected using interview instruments, questionnaires, observation, analysis of procedures and survey document. The results of this study showed that most of the learning resources and teaching materials used by teachers in schools were printed books with a score of 81%, and the most frequently used media in teaching was PowerPoint media with a score of 41.67%. This fact resulted in the lack of students' interest in solving everyday problems and low students' learning outcomes. In other words, the learning media used in the classroom did not suit their needs, so the development of teaching materials and media is needed to facilitate students in learning activities independently. Teaching Work and Energy materials that are widely applied in everyday life requires media in the form of physics e-modules. The development of physics e-modules on work and energy materials can overcome the problems found in the classroom, especially when teaching that material.*

Keywords: *e-module physics; energy; needs analysis; work*

© 2023 Physics Education Department, Universitas Muhammadiyah Makassar, Indonesia.

I. INTRODUCTION

The rapid development of science and technology requires humans to expand from time to time, and they must be able to respond to these challenges (Meyer et al., 2019). One of the efforts is to develop human resources (Annisa, 2022). The mission can be accomplished by focusing on education sector, as suggested by Desnita et al. (2022) and Hendriyani et al. (2018). This transformation demands the world of education to keep up with technological changes as efforts to improve educational quality, particularly in modifying the use of technology in the teaching and learning process (Nurjannah, 2021).

The advancements in technology have caused a transition in the learning process in education from traditional (face-to-face) education to open education that is interactive, competitive, interdisciplinary, and productive (Simarmata et al., 2019). In this development, educators are required not only to share information with students but also to prepare media and instructional materials that may aid in the delivery of material (Fauziah et al., 2023; Usmeldi et al., 2017). There are several factors that can impact students' achievement, but the educator, in this case, the teacher, plays the most significant role (Azmar & Ali, 2022). Currently, the 2013 curriculum guides the teacher as a mediator and facilitator in learning (Saputra et al., 2022). As a facilitator, the teacher must be able to provide various learning facilities so that students can easily obtain information (Gaol et al., 2023). Teachers, as facilitators and mediators, need media that can be used in the learning process (Novisya & Desnita, 2020; Wulandari et al., 2023).

Learning medium functions as a tool that helps explain the lesson in order to achieve the learning goals effectively (Andani et al., 2020). The development of various types of learning media and teaching materials is considered as a form of effort in improving the quality of education (Novisya & Desnita, 2021). The presence of learning media in the learning process, according to Novisya and Desnita (2021), will increase students' attention and enhance students' learning motivation.

The use of learning media and teaching materials in the learning process can also help students improve understanding, present data in an interesting and reliable manner, facilitate interpretation of data, and conclude information (Dananjaya, 2017; Fadilah et al., 2023). The use of media and learning resources is a component that influences the learning process. Meyer et al. (2019) have demonstrated the efficacy of virtual reality and video learning media in enhancing the quality of the learning process. Digital-based learning media was also utilized by Schneider et al. (2018) in their study.

According to our survey on learning media and teaching materials used by teachers in the learning process in State Senior High School 3 Lubuk Basung, State Madrasah Aliyah 1 Padang, dan State Senior High School 3 Kaur Bengkulu, it is found that learning media and teaching materials such as smartphones, PheT simulations, PowerPoint computers, printed books, internet, worksheets, and other are widely used. Some students regard media and educational materials that are frequently utilized by teachers as tedious and less interesting, and therefore, students are less motivated to read and enhance current knowledge. To address this, we require media and learning resources that can assist students in their learning. The physics e-module is one of them. This e-module is important to develop since modern

teaching materials must be practical and interesting, and students must be able to carry out learning activities independently (Hamid & Alberida, 2021).

Several previous studies have indicated that students experience a beneficial influence after utilizing the physics e-module as a learning medium. Fauziah et al. (2023) reported that the results of learning using the e-module physics media provide maximum completeness values and are suitable for use. Furthermore, according to research by Fitriyanti & Yerimadesi (2023), the results obtained after students study with the use of e-modules show a rise in learning motivation and character in students. We hope to convey the findings of the preliminary condition study in this paper. As an initial study, a needs analysis was conducted to determine the scale of the need in order to develop physics e-modules on Work and Energy material for class X. Therefore, this study aimed to see the need for developing e-modules in physics on Work and Energy material for class X in senior high school.

II. METHODS

This research is a survey research using quantitative and qualitative approaches. Quantitative and qualitative approaches are used to deepen research on the subjects studied. Novisya & Desnita (2020) stated that survey research does not treat research subjects but makes observations. The objects studied are related to learning resources, teaching materials and learning media which are listed in Table 1. As follows:

Table 1. The number of class X students in three schools for 2022/2023 school year

No.	School	Student
1	State Senior High School 3 Lubuk Basung	30
2	State Madrasah Aliyah 1 Padang	50
3	State Senior High School 3 Kaur Bengkulu	73
	Total	153

There were several instruments used used in data collection, namely learning resource instrument and learning media instrument to collect quantitative data, and interview instruments to collect qualitative data in the form of information about media used by teachers in schools and data analysis of work and energy materials.

The data analysis methods used in this study were interviews, questionnaires, observation, procedure analysis, and document survey. Technical analysis for qualitative data is carried out by reducing data, presenting and verifying data while quantitative data analysis is carried out by processing and categorizing the data obtained.

Based on the procedure mentioned above, it can be described as part of the flow as shown in Figure 1 below.

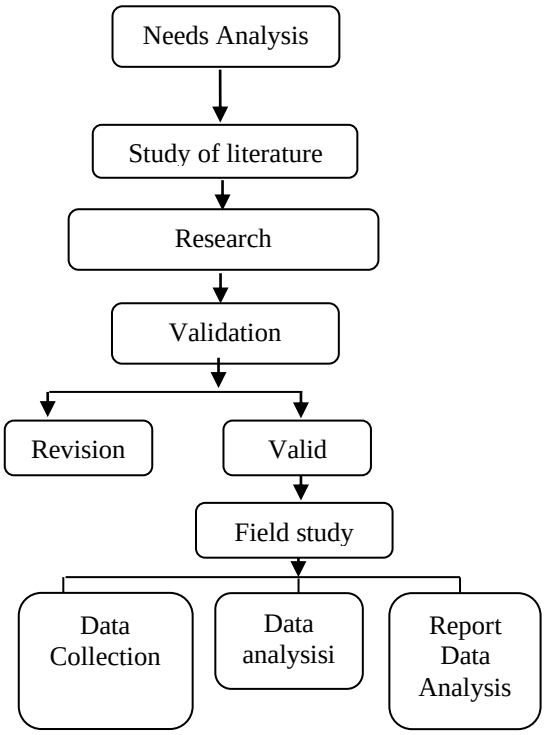

Figure 1. Research flowchart

In the Figure 1 above, the first stage of the needs analysis was a literature study. After looking for relevant sources, the researcher composed a research instrument about learning resource and learning media. After the instrument was prepared, it was validated by expert lecturers. When the instrument needed to be revised, the researchers revised first and gave it back to the expert lecturer to be re-examined. Furthermore, after the instrument was claimed valid, it was distributed to several schools to collect data Google form. The data obtained were then analyzed, concluded, and reported.

III. RESULTS AND DISCUSSION

The results of the data analysis from the research instruments on learning resources and teaching materials can be seen in table 1.

Table 2. Learning resources and teaching materials used by students in schools

No.	Learning Resources	Score %
1	Printed book	81%
2	Internet	15%
3	Student Worksheets	38%
4	Module	15%
5	Others	3.3%

Table 2. shows the results that 81% of students used teaching materials in the form of printed books, 15% used internet learning resources, 38% used worksheets, 15% used modules and 3.3% used other learning resources and teaching materials. It can be concluded that in Table 2. Majority of students (81%) used made use of printed books as learning resources and teaching materials at school.

Considering that in general students use printed books in learning physics, a survey was conducted on the media used. According to Novisya & Desnita (2020) media is a supporting tool for printed books that are used to display phenomena that exist in everyday life, especially related to Work and Energy materials. The surveyed media related to smartphone media, Phet simulation, PowerPoint, computer, etc. are shown in Table 3.

Table 3. Learning Media used by Students in Schools

No.	Learning Resources	Score %
1	Smartphone	18.66%
2	Phet simulation	22.33%
3	Power point	41,67%
4	Computer	11%
5	Others	37,33%

Table 3. shows that 18.66% of teachers used smartphones as learning media, 22.33% of teachers used PhET simulations to assist online practicums, 41.67 teachers used PowerPoints learning media, 11% of teachers used computers as learning media by inviting students to study in ICT laboratories, and 33% of teachers used other learning media. Thus, tt can be concluded that the most used media by teachers in teaching was PowerPoint media with a score of 41.67%.

Based on the results of data obtained from interviews related to learning resources and teaching materials, it was said that the teaching materials used were appropriate with the 2013 Curriculum, if it is not appropriate then the teaching materials or the material submitted is not appropriate to achieve Basic Competencies and learning Indicators. In providing teaching materials in the form of teaching materials, teachers pay attention to the poor conditions of students in understanding physics learning material. The learning resources used by teachers to teach students were class X science physics handbook (printed book), the internet, student worksheets, modules, etc.

Furthermore, based on the results of the data obtained from interviews related to learning media, it was found that the learning media used by teachers was in the form of interactive media in the form of simulation media, animation media and several other media. Although sometimes the media is not always used in every physics learning, they made students active in learning.

The existence of learning media has a big influence on students in receiving lessons given by the teacher. In general, students need more interactive and fun learning media fun in the form of learning animations, simulations and learning videos and supported by practicum tools that can help in doing experiments.

Some of the factors that cause the teacher's low ability to use media and teaching materials in the learning process are: 1) the lack of teacher skills in using digital media due to the lack of training in making media, 2) the limited availability of facilities such as projectors in schools so that the media displayed were not as planned, 3) the large workload of teachers in schools so that there was limited time in making media in learning process, 4) learning focused more on training students with questions than using media and teaching materials in the learning process (Nasir et al., 2022).

From the explanation above, in order to improve the use of media in the learning process, it is necessary to have training provided by the government for physics

teachers in making media so that the media produced is in accordance with the demands of the 2013 curriculum which trains students' 21st century abilities (Kurniati et al., 2021). In addition to the training, it is also necessary to provide complete facilities in schools so that the media can be displayed as it should be. In addition, the teacher's workload should be reduced, so teachers can run their tasks effectively (Belia et al., 2022).

Considering the needs of the 2013 curriculum and students' characteristics, it is necessary to develop a physics e-module on Work and Energy material. The reason for selecting the physics e-module is because this e-module can be used as a tool for conveying messages/material content that combines two or more media elements, including text, images, graphics, photos, sound, film and animation in an integrated manner (Erlina et al., 2022; Said et al., 2021). Therefore, the use of e-modules can be an alternative solution for learning resources that are integrated with various advantages of electronics contents (integrated with images, animations, videos, and simulations) and can be accessed anytime and anywhere with the help of internet network. This can train students' 21st century skills in solving and analyzing phenomena that exist in everyday life with the material being studied so that learning becomes meaningful (Desnita et al., 2022; Anisa, 2023). To facilitate students' 21st century abilities in solving and analyzing everyday life according to the demands of the 2013 curriculum, the development of an e-module of physics was carried out. The developed physics e-module does not only contain explanations but contains a number of phenomena that will be analyzed by students.

From the results of the material analysis that has been carried out on the material of Work and Energy, it was known that this material has a lot of contexts and is very close to the daily life both in life activities and the use of technology. Many of these contexts can be presented in the classroom through physics e-modules. This physics e-module can display the phenomenon of work and energy as a whole without any limitations, and directs students to analyze it through elaboration, so that learning becomes meaningful and not monotonous. Novisya & Desnita (2020) argued that learning is not only done in the form of conceptual understanding but learning is done to train students to think maturely and in depth from the material being studied. Train students' abilities by directing learning related to everyday life applications.

Therefore, the analysis of the needs for the development of physics e-modules on Work and Energy materials can help overcome problems found in the field by developing a product in the form of physics e-modules on Work and Energy materials. E-modules can help educators in the learning process so that it is not too monotonous for students to analyze in an elaborative manner,

so that learning becomes meaningful and not monotonous.

This research is also in line with (Malina et al., 2021) stating that based on the needs analysis carried out, the problems in the physics learning process show how important it is to develop teaching materials in the form of e-modules. In addition, it is also in line with (Imaningtyas et al., 2016) stating that the purpose of the e-module is developed so that students learn independently without or with teacher guidance so that this module contains the basic components of teaching materials.

The use of e-modules as teaching materials or learning resources can provide many advantages including providing immediate feedback for students, adjusting individual's ability by providing freedom in determining the pace of learning and understanding both in terms of form and lesson material, and making teachers and students easy to know which pasts of the modules students have successfully achieved and which have not so students achieve their learning objectives according to their abilities (Bakri et al., 2015).

IV. CONCLUSION AND SUGGESTION

Based on the preliminary data analysis that has been done, the most frequently used teaching resources by teachers and students in the learning process of work and energy materials was printed books. The media used by the teacher to teach material on Work and Energy are smartphones, phet simulations, Powerpoint computers, etc. The results also show that the cause of the lack of students' interest in solving everyday problems and the low student learning outcomes was learning media that are not in accordance with their needs. Media and teaching materials are needed to facilitate students to learn to solve everyday problems that are practical and not monotonous, which indeed require students to be able to carry out learning activities independently. Work and Energy materials that have many daily applications require media in the form of physics e-modules.

It is hoped that future research will not only focus on this research because this research is only limited to analyzing the needs of developing e-modules and it is better for future researchers to be able to develop teaching materials needed by teachers and students in schools to maintain students' motivation in learning physics effectively. Teachers must provide a fun learning environment, engage students, assess learning outcomes regularly, and adapt learning to advances in technology.

REFERENCES

Andani, T., Mawaddah, I. Z., & Yuliani, H. (2020). Analisis kebutuhan pengembangan media pembelajaran komik berbasis web pada pokok bahasan efek doppler di SMA. *Prosiding Seminar Nasional Fisika (SNF)*, 26–32.

Anisa, N. (2023). *Pengembangan e-modul menggunakan 3D pageflip professional dengan pendekatan*

IBSE (Inquiry Based Science Education) pada materi fluida statis Skripsi. UIN Raden Intan Lampung.

Annisa, N. (2022). *Pengembangan bahan ajar elektronik fisika terintegrasi stem untuk meningkatkan pengetahuan dan literasi baru siswa kelas XI SMA*. Thesis. Universitas Negeri Padang.

Azmar, A., & Ali, L. U. (2022). Development of a prototype book based on the study of the Al-Quran as teaching material for physics. *Jurnal Pendidikan Fisika*, *10*(3), 208-218. https://doi.org/10.26618/jpf.v10i3.8331

Bakri, F., Rasyid, R., & Mulyaningsih, R. D. A. (2015). Pengembangan modul fisika berbasis visual untuk Sekolah Menengah Atas (SMA). *JPPPF (Jurnal Penelitian & Pengembangan Pendidikan Fisika)*, *1*(2), 67–74. https://doi.org/10.21009/1.01211

Belia, G., Murtono., Utaminingsih, S., & Pratama, H. (2022). Analysis of e-module needs with the flip pdf professional application for integers. *ICCCM Journal of Social Sciences and Humanities*, *1*(1), 8–15. https://doi.org/10.53797/icccmjssh.v1i1.2.2022

Dananjaya, U. (2017). *Media pembelajaran aktif*. Nuansa Cendekia.

Desnita, D., Festiyed, F., Novitra, F., Ardiva, A., & Navis, M. Y. (2022). The effectiveness of CTL-Based physics e-module on the improvement of the creative and critical thinking skills of senior high school students. *TEM Journal*, *11*(2), 802-810. https://doi.org/10.18421/tem112-38

Erlina, R., Risdianto, E., Hamdani, D., Fathurrochman, I., Efendi, R., & Prananosa, A. G. (2022). An analysis of needs response to the development of e-module material elasticity and hooke law at Lebong regency high school. *JMKSP (Jurnal Manajemen, Kepemimpinan, dan Supervisi Pendidikan)*, *7*(1), 163–187. https://doi.org/10.31851/jmksp.v7i1.6458

Fadilah, A., Nurzakiyah, K. R., Kanya, N. A., Hidayat, S. P., & Setiawan, U. (2023). Pengertian media, tujuan, fungsi, manfaat dan urgensi media pembelajaran. *Journal Of Student Research*, *1*(2), 01–17. https://doi.org/10.55606/jsr.v1i2.938

Fauziah, A. D., Susila, A. B., & Susanti, D. (2023). Pengembangan e-modul fisika berbasis android dengan pendekatan STEM pada materi fluida dinamis. *Prosiding Seminar Nasional Penelitian dan Pengabdian Kepada Masyarakat*, 112–121.

Fitriyanti, A., & Yerimadesi. (2023). Efektivitas e-modul hidrokarbon berbasis guided discovery learning terhadap hasil belajar peserta didik kelas XI di SMAN 13 Padang. *Jurnal Ilmiah Universitas Batanghari Jambi*, *23*(1), 730-735. http://dx.doi.org/10.33087/jiubj.v23i1.3036

Gaol, A. F. L., Nelyahardi, N., & Yaksa, R. A. (2023). Faktor motivasi dalam mendorong keberhasilan belajar siswa di SMA Negeri 4 Kota Jambi. *Journal On Education*, *5*(2), 2801–2807. https://doi.org/10.31004/joe.v5i2.927

Hamid, A., & Alberida, H. (2021). Pentingnya mengembangkan e-modul interaktif berbasis flipbook di sekolah Menengah Atas. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(3), 911-918. https://doi.org/10.31004/edukatif.v3i3.452

Hendriyani, Y., Jalinus, N., Delianti, V. I., & Mursyida, L. (2018). Analisis

kebutuhan pengembangan media pembelajaran berbasis video tutorial. *Jurnal Teknologi Informasi dan Pendidikan*, *11*(2), 85–88. https://doi.org/10.24036/tip.v11i2.147

Imaningtyas, C. D., Karyanto, P., Nurmiyati, N., & Asriani, L. (2016). Penerapan e-module berbasis problem-based learning untuk meningkatkan literasi sains dan mengurangi miskonsepsi pada materi ekologi siswa kelas X Mia 6 SMAN 1 Karanganom tahun pelajaran 2014/2015. *Bioedukasi: Jurnal Pendidikan Biologi*, *9*(1), 4–10. https://doi.org/10.20961/bioedukasi-uns.v9i1.2004

Kurniati, R. D., Andra, D., & Distrik, I. W. (2021). E-module development based on pbl integrated stem assisted by social media to improve critical thinking skill: a preliminary study. *Journal Of Physics: Conference Series*, *1796*, 1-9. doi:10.1088/1742-6596/1796/1/012077

Malina, I., Yuliani, H., & Syar, N. I. (2021). Analisis kebutuhan e-modul fisika sebagai bahan ajar berbasis PBL di MA Muslimat NU. *Silampari Jurnal Pendidikan Ilmu Fisika*, *3*(1), 70–80. https://doi.org/10.31540/sjpif.v3i1.1240

Meyer, O. A., Omdahl, M. K., & Makransky, G. (2019). Investigating The effect of pre-training when learning through immersive virtual reality and video: A media and methods experiment. *Computers & Education*, *140*, 1-17. https://doi.org/10.1016/j.compedu.2019.103603

Nasir, M., Sunarno, W., & Rahmawati, F. (2022). Flipped classroom using e-module to improve understanding of light concepts: needs analysis of e-module development to empower scientific explanation. *Journal Of Physics: Conference Series*, *2165*, 1-9. doi:10.1088/1742-6596/2165/1/012040

Novisya, D., & Desnita, D. (2020). Analisis pengembangan video pembelajaran fisika berbasis CTL pada materi fluida. *JIPI (Jurnal IPA & Pembelajaran IPA)*, *4*(2), 141–154. https://doi.org/10.24815/jipi.v4i2.16682

Novisya, D., & Desnita, D. (2021). The validity of contextual-based learning video on the physics fluid material for senior high school. *Internasional Journal of Progressive Science and Technologies*, *25*(2), 69–77. http://dx.doi.org/10.52155/ijpsat.v25.2.2830

Nurjannah, F. (2021). *Evaluasi penggunaan video conference pada mata kuliah aplikasi komputer di Fakultas Ekonomi dan Bisnis Universitas Jenderal Soedirman*. Skripsi. Universitas Jenderal Soedirman.

Said, M. A., Arsyad, M., & Tawil, M. (2021). The development of electronic practicum modules at electronic course for physics education program. *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, *7*(2), 99-106. https://doi.org/10.21009/1.07201

Saputra, I. G. P. E., Harnipa, H., Pertiwi, P., & Hasan, N. (2022). Analysis of students' ability to apply physics concepts through environmental-based worksheets on junior high school. *Jurnal Pendidikan Fisika*, *10*(3), 227-236. https://doi.org/10.26618/jpf.v10i3.8507

Schneider, S., Nebel, S., Beege, M., & Rey, G. D. (2018). The Autonomy-enhancing effects of choice on cognitive load, motivation and

learning with digital media. *Learning and Instruction*, *58*, 161–172. https://doi.org/10.1016/j.learninstruc.2018.06.006

Simarmata, J., Sari, D. C., Purba, D. W., Mufarizuddin., & Hasibuan, M. S. (2019). *Inovasi pendidikan lewat transformasi digital*. Yayasan Kita Menulis.

Usmeldi, U., Amini, R., & Trisna, S. (2017). The development of research-based learning model with science, environment, technology, and society approaches to improve critical thinking of students. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 318–325. https://doi.org/10.15294/jpii.v6i2.10680

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya media pembelajaran dalam proses belajar mengajar. *Journal on Education*, *5*(2), 3928–3936. https://doi.org/10.31004/joe.v5i2.1074