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Physics Teachers' Perceptions of Senior High Schools in Merauke on Self-Regulation of Digital Instructional Materials

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Abstract

This study describes the high school and MA physics teachers' perceptions of the need for digital teaching materials like e-modules, e-student worksheets, e-comics, and learning videos. The type of research used is descriptive quantitative. Therefore, as many as 12 physics teachers from SMA and MA in Merauke City were sampled in the study. The sample in this study was selected through a purposive sampling technique with criteria based on educational strata, length of teaching, educator certificate and ease of access. Furthermore, data collection was carried out using an instrument in the form of a questionnaire containing 30 statement items with a Likert scale consisting of 5 answer choices. Then, data analysis uses descriptive statistics. The result of this analysis is the accumulation of basic data in the form of the percentage of total responses followed by determining response criteria using interpretation criteria. Based on these criteria, it can be seen that the criteria for physics teachers' perceptions of the need for digital teaching materials. The study results show that the average perception of physics teachers is 88.1% and is included in the criteria for needing digital teaching materials. According to the teacher's perception, the order of priority for teaching material needs is e-module with the TPACK approach (91.3%), e-student worksheets with a scientific approach (83.3%), and interactive multimedia-based learning videos (75%). This research collected data on the perceptions of physics teachers at SMA and MA Merauke as a stage of needs analysis in development research. Based on the results of this analysis, further research will be carried out regarding the development of digital teaching materials in the form of e-modules, e-student worksheets, and learning videos.

Keywords: Digital Instructional Material; Physics Teacher; Perception

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INTRODUCTION

The growth of Internet technology has made it easier for teachers and students to access a wide range of information, such as learning materials. Accessing the internet is easy on laptops, smartphones, and other personal computers, so every teacher has the same chance to develop

new ideas and make instructional materials as needed. Developing instructional materials is part of the professional duties and skills that every teacher must master. This is because instructional materials aim to make it easier for educators and students to carry out learning activities. Therefore, many researchers are encouraged to analyze the need for instructional materials. One of them is a study by Oktavia et al. (2020) that examined the requirements for physics instructional materials on elasticity among students in grade XI. The study's findings showed that students require alternative instructional materials, such as interactive learning tools with videos, examples, and practice questions, to help them surmount the difficulty of learning independently at home. Moreover, Nurdini et al. (2018) have also researched the analysis of instructional materials and revealed that in writing physics instructional materials, aspects of science literacy should be added so that students do not just memorize formulas.

Instructional materials are all materials that contain learning materials and are arranged systematically to facilitate the learning process. This definition is highly broad, as the material can be anything, written or unwritten, printed or electronic, including modules, pamphlets, students' worksheets, animations, and learning videos. Written instructional materials are teaching materials created in written form and contain subject matter that addresses aspects of knowledge, skills, and attitudes designed to help students acquire core and fundamental competencies. Decent instructional materials must meet at least four criteria, including coverage of material created following core competence and basic competence, readability, comprehension, and student interest (Pusat Kurikulum dan Perbukuan, 2012). In addition, Oktaviani et al. (2017) emphasized that five characteristics must be included in instructional material, namely: self-instructional (instructional materials are designed to create independent learners); self-contained (learning materials in teaching materials are compiled completely according to core competence and basic competence); self-contained (learning materials in teaching materials are compiled completely according to Stand alone (instruction materials are prepared without relying on other media); adaptive (instructional materials are prepared in accordance with the advancement of science and technology in the twenty-first century); and user-friendly (teach materials are easily accessible and flexible).

The use of instructional materials in learning has advantages, including a variety of content from instructional materials that are not only limited to text but also include various images and videos that can support learning material (Puspitasari et al., 2020). This certainly increases the motivation of students to keep up with the learning process. Similar to the findings of Lesmono et al. (2012), the use of instructional materials can increase students' motivation and comprehension of physics concepts. According to research conducted by Hayati et al. (2020) on the perceptions of instructors and prospective physics teachers regarding instructional material, many prospective physics teachers still cannot provide examples from instructional materials. This affects the effectiveness of the teacher's implementation of learning, according to research conducted by Rahmawati & Sarwanto (2022), in order to maximize learning implementation, teachers require digital instructional materials. Using digital instructional materials makes studying independently or in groups simpler, which is consistent with recent technological advancements (Latifah & Utami, 2019; Misbah et al., 2021). Seeing the numerous benefits of using teaching materials in the learning process makes physics instructional materials a

particularly attractive instrument for the learning process. According to Rachman (2018), physics teaching materials are necessary because they can make the learning process more directed and engaging.

In addition, one effort that can be made to support learning in the digital school era is the development of digital learning aids. The instructional materials are one of them. In order for 21st-century physics education to operate effectively, it is anticipated that efforts will be made to create digital instructional materials. According to Hartini et al. (2018) and Wati et al. (2021), physics education can be conducted efficiently using digital instructional materials.

Due to the fact that learning in the 21st century is presently inseparable from the use of technology, this research is crucial. In addition, students are very familiar with the use of internet-connected digital media. This should be considered a benefit for attracting student interest and encouraging self-regulated learning by creating digital resources. This educational resource consists of digital instructional materials, Instructions for learning, competencies to be attained, learning materials, and practice questions. An evaluation must be included in the digital instructional materials to be created.

Recent studies have shown that a synergistic comprehension of the subject matter, teaching methods, and the use of ICT support the success of 21st-century learning. Reski & Sari (2020) indicated that physics teachers in the district of Merauke have not been optimal in implementing ICT-based learning that integrates three key areas of knowledge: content, pedagogy, and technology. This is not the case. One of the factors contributing to this is the lack of learning resources in the form of instructional materials that support the classroom learning process. Therefore, conducting a study or needs analysis regarding the instructional materials students in Merauke to require (Reski & Hasanah, 2022) is essential. The objective is to determine which digital instructional materials are most essential to classroom learning today. Based on the findings of this analysis, additional research will be conducted regarding creating digital instructional materials. E-modules integrated with the TPACK approach, e-student worksheets integrated with the scientific approach, local wisdom-based comics, and interactive multimedia-based learning videos are the categories of digital teaching materials.

METHOD

The research method employed is descriptive-quantitative. The research sample consisted of 12 physics instructors from Merauke's SMA and MA levels. This cohort was drawn from the research population, which included every SMA and MA in Merauke. Then, using the purposive sampling technique in conjunction with the descriptive quantitative method, 12 physics teachers were chosen to represent their respective schools, namely 4 SMA and 2 MA. This sample was chosen based on educational strata, teaching experience, possession of educator certification, and accessibility. Therefore, the sample should be representative of the research population (Mazen & Tong., 2020).

The data collection technique used is a questionnaire of teacher perceptions of the need for teaching materials as learning resources. The questionnaire contains 30 statement items and uses a Likert scale of 5 answer choices. Teacher Perception Indicators are listed in Table 1.

Tabel 1 Indicator of teacher perception

Indicator	Item	Number
E-Modul (TPACK-Based)	1,3,5,7,9,11, 13,15	8
E-student worksheets	2,4,6,8,10, 12,14,16	8

Indicator	Item	Number
(Scientific Approach)		
Learning Video (Multimedia-based Interactive)	17,19,21,23, 25,27,29	7
e-Comics (Based on Local Wisdom)	18,20,22,24, 26,28,30	7
Total		30

Two experts had validated the teacher perception indicators in Table 1 as a condition of instrument eligibility before being used in the study. The overall relevance of the two experts was Gregory's content validity, which was in the form of a content validity coefficient. The content validity coefficient is calculated using the following formula:

$$\text{Content Validity} = \frac{D}{A + B + C + D} \quad (1)$$

Based on the results of the calculation, the content validity of the teacher perception instrument was 87%. Where, the criteria for an instrument were said to be valid if it meets the construct validity, namely if the instrument item had a variable content coefficient with V> 75% (strong relevance) of the maximum score. (Gregory, 2011).

According to Riduwan (2015), the Likert scale consists of 5 (five) answer options, namely strongly agree (SS), agree (S), moderately agree (CS), disagree (TS), and strongly disagree (STS). Furthermore, the data that has been collected is analyzed using descriptive statistics. This analysis yields accumulated basic data in the form of a total percentage of responses, followed by determining response criteria based on interpretation criteria. Based on these criteria, it is possible to determine how physics teachers perceive the need for digital instructional materials. The stages involved in data analysis are described as follows:

1) Determine the total score for each item.
2) Determine the percentage of the total score for each statement item by using the formula:

$$P = \frac{\sum X}{\sum X_i} \, x \, 100\% \quad (2)$$

3) Determine the total percentage of all responses with the formula:

$$P_{total} = \frac{\sum P}{n} \, x \, 100\% \quad (3)$$

4) Determine the response criteria of all statement items according to Table 2.

Table 2 The interpretation of criteria

Criteria	Interval (%)
Greatly need	81 < P > 100
Need	61 < P > 80
Fairly need	41 < P > 60
Do not need	21 < P > 40
Extremely do not need	0 < P > 20

RESULT AND DISCUSSION

Six schools in Merauke City were chosen as the research samples or respondents. Those schools are SMA Negeri 1, SMA Negeri 2, SMA Negeri 3, SMA Negeri 4, MA Al-Hikmah, and MA Al-Munawwaroh. Therefore, each school is represented by two physics teachers as a sample intended to represent the population of teachers and schools in the city of Merauke. Consequently, each teacher who participated as a respondent in this study was provided with a questionnaire form containing 15 statement items with five possible responses. The responses from these physics teachers were then analyzed using descriptive statistics to determine a total percentage, which was then interpreted according to the criteria in Table 2. The perceptions of physics teachers regarding the need for digital instructional materials are detailed in Table 3 below in the form of a percentage.

Table 3 Physics teachers' perception

Respondent	Percentage (%)
Teacher 1	86.7
Teacher 2	82.3
Teacher 3	93.3
Teacher 4	88.0
Teacher 5	85.3
Teacher 6	86.7
Teacher 7	94.7
Teacher 8	93.3
Teacher 9	81.3
Teacher 10	85.3
Teacher 11	88.0
Teacher 12	92.0
Mean	**88.1**

According to the data presented in Table 3, it can be stated that physics teachers in Merauke City need digital instructional materials. This is proved by the available data showing the average percentage attained is 88.1%, which, if interpreted in accordance with Table 1, meets the criterion for great need. This also indicates that physics teachers at the SMA and MA levels in Merauke City require support from all extant stakeholders to access digital learning resources. Due to the impact of technological advancements, this digital instructional material is essential and necessary. Since the current learning model has entered the digital 4.0 era, technology has been incorporated into the learning process. The perspective of physics teachers on the need for digital instructional materials is crucial because it can be used as a point of reference in developing digital instructional materials. This information can also determine what instructional materials need to be developed. As stated by Utami & Atmojo (2021), it is essential to map the needs of teachers as the first stage in determining whether or not to develop digital instructional materials. In addition, information regarding the requirements of each school in providing digital instructional materials as a practical and flexible learning resource can be gleaned from teachers' perceptions.

Based on the results of data analysis, it can be concluded that SMA and MA students in Merauke City require digital instructional materials specifically for physics subjects. This is evidenced by the average percentage of teacher perceptions for each school being greater than 81%. The average percentage of schools that perceive the need for digital instructional materials is presented in Figure 1.

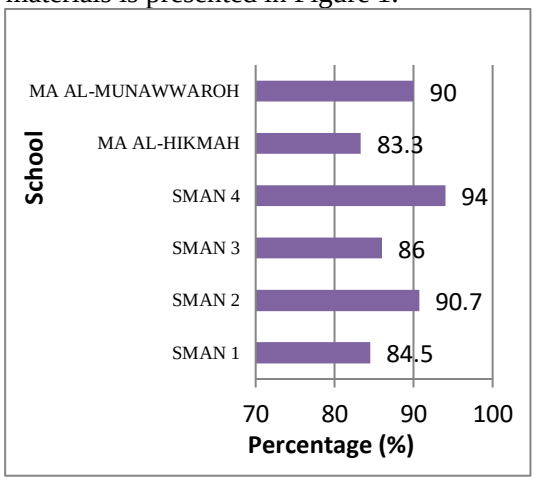

Figure 1 The perception of each school

According to Figure 1, three schools have the highest perception, namely SMAN 4, SMAN 2, and MA Al-Munawwarah. In addition, the analysis results determined that SMAN 4 provided the highest perception at 94% while MA Al-Hikmah provided the lowest perception at 83.3%. One of the internal factors contributing to the low perception given by physics instructors at MA Al-Hikmah is that students are still limited in using cell phones, and the school lacks a computer laboratory and an internet network. Therefore, teachers continue to prefer printed instructional materials to digital instructional materials. It is a well-known fact that the concept of digital learning certainly requires digital media that is connected to the internet.

The SMAN 4 physics teachers strongly agreed that digital instructional materials should be developed. This digital instructional material is intended to help students develop their self-regulated learning at home. In accordance with this

view, Taufik et al., (2020) stated that students with greater self-regulated learning tend to be more accountable for planning, implementing, and assessing the quality of their learning. Furthermore, self-regulated learning can enhance students' knowledge, skills, and learning outcomes (Henukh et al., 2022). In addition, teachers recognize that the use of technology in learning enables students to access instructional materials from anywhere and at any time. As stated by Reski & Hasanah (2022), the characteristics of 21st-century learners who are familiar with technology must be viewed as a learning base, necessitating the incorporation of ICT into learning through the provision of diverse, flexible, and readily accessible learning resources. Then, physics teachers at MA Al-Munawwaroh also strongly agreed with an average perception of 90%, which, if interpreted according to Table 1, places them in the category of having an urgent need for digital instructional materials. Physics teachers at MA Al-Munawwaroh recognize that the availability of digital instructional materials benefits students and contributes to the teachers' professional competence. This is because using digital instructional materials requires the mastery of two types of knowledge: content knowledge and technological knowledge, as well as the ability to integrate the two. Hence, it indirectly improves the competence of teachers. Reski & Bawawa (2022) also stated that the availability of instructional materials can facilitate teachers learning and enhance their professional competence. A teacher's professional competence facilitates the transfer of knowledge to students so that the students will comprehend the content and concepts of the material conveyed by the teacher more easily and rapidly (Reski et al., 2020).

These digital instructional materials can be in the form of e-modules, e-student worksheets, e-comics, learning videos, and others. The priority order of digital instructional material needs according to teacher perceptions is presented in Table 4.

Table 4 Kinds of digital instructional materials

Digital Instructional Materials	Percentage (%)
E-Modul (TPACK-based)	91.7
E-student worksheets (Scientific Approach)	83.3
Learning Video (Interactive-Multimedia-based)	75.0
e-Comic (Local-wisdom-based)	50.0

According to the results of the data analysis presented in Table 4, physics teachers rank e-modules as the most important need in priority order for facilitating current learning. E-modules are regarded as practical instructional materials with a complete package. This is because it contains learning objectives, material, sample questions, learning videos, summaries, and evaluation questions. In terms of usability, it is also practical because it can be accessed through a smartphone. Providing instructional materials in the form of e-modules is one of the professional responsibilities of teachers as facilitators. According to Reski (2018), the availability of classroom learning facilities can affect students' motivation to learn. Additionally, e-modules can encourage students to learn independently (Setyandaru et al., 2017). Furthermore, Aditya et al. (2019) revealed that modules could be used as independent learning media for students.

E-modules must be developed with more directed and structured approaches, methods, or models because they are equipped with learning steps. One of the most chosen approaches by teachers is TPACK since it is an approach that incorporates material, pedagogical and technological knowledge (Reski & Sari,

2020). This is in line with the results of an exploratory study conducted by Reski & Hasanah (2022), which found that as many as 63.3% of high school and MA students in Merauke City strongly agreed to develop TPACK-based modules. Based on this study's findings, students strongly agree that the TPACK framework is included in the physics module because it contains three pieces of knowledge at once: technological, material and pedagogical. Consequently, in becoming independent learners who master technology, comprehend physics concepts and the application of physics in daily life. In addition, physics teachers also strongly agree if e-student worksheets development is carried out. In accordance with teacher perceptions in Table 3, as many as 83.3% of physics teachers believe that e- student worksheets should be developed as a form of instructional material. Physics teachers consider instructional materials in the form of student worksheets to help optimize learning. This is also supported by the findings of (Suryaningsih & Nurlita, 2021) research, which revealed that one method to optimize students' skills is through practicum, necessitating the need for student worksheets. Furthermore, to adapt to the world's ever-increasing rate of change, science must be integrated with technology; therefore, an electronic student worksheets must be developed (Sa'adah et al., 2020). E- student worksheets can be used to guide students in understanding concepts. According to Majid (2015), incorporating student worksheets into learning can assist teachers in instilling concepts in students.

Similar to modules, student worksheets necessitates a more structured approach. Based on the analysis findings, the teachers selected a scientific approach. The scientific method is appropriate for providing students with learning experiences through observing, questioning, gathering information, associating, and communicating (Daryanto & Karim, 2017). E-student worksheets that are attractively designed with a scientific approach are expected to encourage students' engagement to foster meaningful learning (Amthari et al., 2021). In addition, e- student worksheets containing images and videos can pique students' interest and facilitate comprehension of the learning material. This study has limitations in that the samples and indicators of teacher perceptions are still relatively small, so they need to be increased to make the obtained data more valid.

CONCLUSION

Based on the results and discussion above, it can be concluded that the average percentage of physics teachers' perceptions is 88.1% and it is categorized as a great need for digital instructional materials. In addition, physics teachers stated that they require digital instructional materials in the form of modules with the TPACK approach and student worksheets with a scientific approach. Therefore, further research will be conducted to develop digital instructional materials in the form of e-modules, e-student worksheets, and learning videos, in accordance with the perceptions of physics teachers.

REFERENCES

Aditya, S., Haryoto, D., & Pramono, N. A. (2019). Pengembangan modul elektronik fisika berbasis android untuk siswa sma/ma kelas x materi momentum dan impuls. *Jurnal Riset Pendidikan Fisika*, *4*(2), 70–73.

Amthari, W., Muhammad, D., & Anggereini, E. (2021). Pengembangan e-lkpd berbasis saintifik materi sistem pernapasan pada manusia kelas xi sma. *Biodik*, *7*(3), 28–35. https://doi.org/10.22437/bio.v7i3.13239.

Daryanto & Karim. (2017). *Pembelajaran abad 21*. Gaya Media.

Hartini, S., Firdausi, S., Misbah, M., &

Sulaeman, N. F. (2018). The development of physics teaching materials based on local wisdom to train saraba kawa characters. *Jurnal Pendidikan IPA Indonesia*, *7*(2), 130–137. https://doi.org/10.15294/jpii.v7i2.14249.

Hayati, S., Aini, I., & Guntara, Y. (2020). Analisis persepsi guru dan calon guru fisika terkait sumber belajar, media pembelajaran dan bahan ajar. *Prosiding Seminar Nasional Pendidikan Fisika*, *3*(1), 295.

Henukh, A., Loupatty, M., & Supriyadi. (2020). Pengembangan bahan ajar fluida statis terintegrasi google classroom untuk meningkatkan belajar mandiri peserta didik. *Musamus Journal of Science Education*, *2*(2), 56–63. https://doi.org/doi:10.35724/mjose.v4i2.4562

Latifah, S., & Utami, A. (2019). Pengembangan bahan ajar interaktif berbasis media sosial schoology development of interactive physics teaching iptek. *Indonesian Journal of Science and Mathematics Education*, *02*(1), 36–45.

Lesmono, A. D., Wahyuni, S., & Alfiana, R. D. N. (2012). Pengembangan bahan ajar fisika berupa komik pada materi cahaya di smp. *Jurnal Pembelajaran Fisika*, *1*(1), 100–105.

Majid, A. (2015). *Strategi Pembelajaran*. PT Remaja Rosda Karya.

Mazen, J. A. ., & Tong, X. (2020). Bias correction for replacement samples in longitudinal research. multivariate. *Behavioral Research* (Issues 1–23). https://doi.org/10.1080/00273171.2020.1794774.

Misbah, M., Khairunnisa, Y., Amrita, P. D., Dewantara, D., Mahtari, S., Syahidi, K., ... & Deta, U. A. (2021). The effectiveness of introduction to nuclear physics e-module as a teaching material during covid-19 pandemic. *Journal of Physics: Conference Series*, 1760(1), 012052. IOP Publishing.

Nurdini, N., Sari, I. M., & Suryana, I. (2018). Analisis buku ajar fisika sma kelas xi semester 1 di kota bandung berdasarkan keseimbangan aspek literasi sains. *WaPFi (Wahana Pendidikan Fisika)*, *3*(1), 96. https://doi.org/10.17509/wapfi.v3i1.10948.

Oktavia, S. A., Ramalis, T. R., Karim, S., & Feranie, S. (2020). Analisis kebutuhan bahan ajar fisika kelas xi pada materi elastisitas. *Prosiding Seminar Nasional Fisika 6.0*. 87-90.

Oktaviani, W., Gunawan, G., & Sutrio, S. (2017). Pengembangan bahan ajar fisika kontekstual untuk meningkatkan penguasaan konsep siswa. *Jurnal Pendidikan Fisika Dan Teknologi*, *3*(1), 1–7. https://doi.org/10.29303/jpft.v3i1.320

Puspitasari, R., Hamdani, D., & Risdianto, E. (2020). Pengembangan e-modul berbasis hots berbantuan flipbook marker sebagai bahan ajar alternatif siswa sma. *Jurnal Kumparan Fisika*, *3*(3), 247–254. https://doi.org/10.33369/jkf.3.3.247-254.

Rachman, T. (2018). Pengembangan Bahan Ajar Fisika SMA dengan pendekatan Kontekstual Pada Materi Pengukuran Besaran Fisika. *Angewandte Chemie International Edition, 6(11), 951–952.*, *1*(2), 10–27.

Rahmawati, F., & Sarwanto, S. (2022). Persepsi guru fisika terhadap kebutuhan e-modul berbasis android dengan model hybrid-pbl pada materi gelombang bunyi. *Prosiding Seminar Nasional Fisika (E-Journal). https://doi.org/10.21009/03.SNF2022.02.PF.02*.

Reski, A. (2018). Pengaruh fasilitas belajar terhadap motivasi dan hasil belajar fisika mahasiswa. *Musamus Journal of Science Education*, *1*(1), 001–008. https://doi.org/https://doi.org/10.3572

4/mjose.v1i1.859.

Reski, A., & Bawawa, M. (2022). Pelatihan penyusunan bahan ajar online interaktif untuk meningkatkan kompetensi profesional guru ma al-munawwaroh merauke. *ABDIKAN: Jurnal Pengabdian Masyarakat Bidang Sains Dan Teknologi*, *1*(2), 283–288. https://doi.org/10.55123/abdikan.v1i2.302.

Reski, A., & Hasanah, N. (2022). Studi eksploratif : Pengembangan modul fisika sma / ma berbasis framework tpack. *Jurnal Penelitian Pendidikan Fisika*, *7*(2), 145–148. https://doi.org/10.36709/jipfi.v7i2.25463

Reski, A., & Sari, K. (2020). Analisis kemampuan tpack guru fisika se-distrik merauke. *Jurnal Kreatif Online*, *8*(1), 1–8.

Reski, A., Supriyadi, & Loupatty, M. (2020). Analysis of pedagogic competence and professional competence of physics teachers. *Proceedings of the 3rd International Conference on Social Sciences(ICSS)*, 430–434. https://doi.org/10.2991/assehr.k.201014.093.

Riduwan, R. (2015). *Dasar-dasar statistika*. Alfabeta.

Sa'adah, M., Suryaningsih, S., & Muslim, B. (2020). Pemanfaatan Multimedia interaktif pada materi hidrokarbon untuk menumbuhkan keterampilan berpikir kritis siswa. *Jurnal Inovasi Pendidikan IPA*, *6*(2), 184–194. https://doi.org/10.21831/jipi.v6i2.29680.

Setyandaru, T. A., Wahyuni, S., & Putra, P. D. A. (2017). Pengembangan modul pembelajaran berbasis multirepresentasi pada pembelajaran fisika di sma/ma. *Jurnal Pembelajaran Fisika*, *6*(3), 218–224.

Suryaningsih, S. &, & Nurlita, R. (2021). Pentingnya lembar kerja peserta didik elektronik (e-lkpd) inovatif dalam proses pembelajaran abad 21. *Jurnal Pendidikan Indonesia*, *2*(7), 1256–1268.

Utami, N., & Atmojo, I. R. W. (2021). Analisis kebutuhan bahan ajar digital dalam pembelajaran ipa di sekolah dasar. *Jurnal Basicedu*, *5*(6), 6300–6306.https://doi.org/10.31004/basicedu.v5i6.1716.

Wati, M., Apriani, R., Misbah, M., Miriam, S., & Mahtari, S. (2021). Pengembangan e-modul suhu dan kalor bermuatan kearifan lokal melalui aplikasi sigil. *Jurnal Inovasi dan Pembelajaran Fisika*, *8*(1), 112-121.