Jurnal Pendidikan dan Ilmu Fisika (JPIF)
Fakultas Pendidikan Islam dan Keguruan
Universitas Garut
p-ISSN: 2798-9488 e-ISSN: 2798-334X

Development of Learning Media Based on Science Literacy Assisted by *Google Sites* on Source Material

Ni'mah Nur Habibah[1], Reza Ruhbani Amaraulloh[1*], Kinkin Suartini[1]

[1]Program Studi Pendidikan Fisika, Fakultas Ilmu Tarbiyah dan Keguruan Universitas Islam Negeri Syarif Hidayatullah Jakarta
Jl. Ir H. Juanda No.95, Ciputat, Kec. Ciputat Tim., Kota Tangerang Selatan, Banten

*email: rezaruhbaniamarulloh@uinjkt.ac.id

DOI: https://doi.org/10.52434/jpif.v5i1.42412

Accepted: May 2, 2025 Approved: June 10, 2025 Published: June 14, 2025

ABSTRACT

This study focuses on developing scientific literacy-based learning media using Google Sites for energy source material of energy sources assisted by Google Sites focuses on the feasibility of the media and improving students' scientific literacy skills. The research and development design used in this study is 4D (Define, Design, Develop, and Disseminate) and is limited to the Develop stage. Based on the media expert validation test, an average value of 4.31 was obtained with a very good category. The results of improving students' scientific literacy have an N-gain score of 0.3 (moderate category), as well as positive responses from students after using the learning media. Thus, it can be seen that the learning media based on scientific literacy assisted by Google Sites that have been developed are feasible and have received positive responses from students. The development of this media provides a practical contribution by providing alternative media that can be used by teachers to train students' scientific literacy skills.

Keywords: energy sources, google sites, learning media, science literacy.

Pengembangan Media Pembelajaran Berbasis Literasi Sains Berbantuan *Google Sites* pada Materi Sumber Energi

ABSTRAK

Penelitian pengembangan media pembelajaran berbasis literasi sains pada materi sumber energi berbantuan *Google Sites* berfokus pada kelayakan media dan peningkatan kemampuan literasi sains peserta didik. Desain penelitian dan pengembangan yang digunakan pada penelitian ini adalah 4D (*Define, Design, Develop,* dan *Disseminate)* dan dibatasi hanya sampai tahap *Develop*. Berdasarkan uji validasi ahli media meperoleh nilai rata-rata 4,31 dengan kategori sangat baik. Hasil peningkatan literasi sains peserta didik memiliki skor N-gain sebesar 0,3 dengan kategori sedang, serta respon positif peserta didik setelah menggunakan media pembelajaran. Dengan demikian, dapat diketahui bahwa media pembelajaran berbasis literasi sains berbantuan *google sites* yang telah dikembangkan layak dan mendapat respon positif dari peserta didik. Pengembangan media ini memberikan kontribusi praktis dengan menyediakan alternatif media yang dapat digunakan oleh guru untuk melatihkan kemampuan literasi sains peserta didik.

***Kata kunci**: google sites,* literasi sains, media pembelajaran, sumber energi

INTRODUCTION

Science literacy is one of the aspects that must be mastered by 21st century learners which includes identifying scientific questions and drawing conclusions based on scientific evidence related to nature and its changes (OECD, 2019). Science literacy skills can influence students' learning experience so that it can improve students' understanding and quality of learning (Ardianto & Rubini, 2016; Ke et al., 2021) . With the involvement of learners when exploring an issue, it provides the application of scientific knowledge in a broader scope (Suryani et al., 2017). The topic of energy sources is one of the topics in physics learning that is closely related to everyday life. Therefore, learning about energy sources can be used to train students' scientific literacy skills, especially in learning activities that connect scientific concepts with real contexts. Energy literacy involves understanding how energy works in the universe on earth and in social and personal contexts Ramachandran et al. (2024).

Based on the results of measuring science literacy skills in the *Program for International Student Assessment* (PISA) study, it shows that the results of science literacy in Indonesia are still relatively low with a score of 383 points (OECD, 2023) . The low science literacy skills are due to the learning media used that is not effective enough, and students have low interest in reading and repeating learning (Fuadi et al., 2020; Suparya et al., 2022) . This has an impact on the ability of students to relate existing science knowledge to everyday life (Yusmar & Fadilah, 2023) .

Many technologies have been developed as learning media such as the use of computer-based learning media, for example interactive multimedia, *e-books*, e-modules, virtual labs, animated videos and android-based media. In general, the use of computer-based media has a positive effect on increasing students' scientific literacy, but the effectiveness and practicality of the media has not been maximized (Azaly & Fitrihidajati, 2021; Latip & Faisal, 2021) . In accordance with research conducted by Nurhayati & Langlang Handayani, (2020) which states that the use of *Flipbook* media also has access limitations. So, learning media is needed that has easy access, is effective and practical when used, such as the use of *google sites*.

Google Site is a simple website builder *platform*, and does not need special skills in making it (Afifah et al., 2021) . Not only has easy access to using other *google* features, *google sites* can adjust the appearance of the site on the hardware being used (Kalyan, 2020) The use of *google sites* makes it easier for teachers to upload materials and help students get information uploaded by teachers (Azis, 2019) . *Google sites* can be utilized as a science literacy-based learning media on energy source material, because the material described is related to everyday life and can be added with illustrations, animated videos, virtual labs, and so on, which are structured on a site. This is in line with previous research which states that *google sites* are suitable for implementation in learning activities (Amarulloh, 2022; Ismawati et al., 2021; Yanto et al., 2023). Previous studies have revealed a number of potential google sites in physics learning, but few have specifically applied it to train scientific literacy in energy source material. In fact, students' scientific literacy skills, especially when practiced in the concept of energy sources, are very strategic and important. Learning energy sources increases students' awareness of the importance of energy conservation and its impact on the environment (Pradana et al., 2019)

Therefore, the researcher is interested in developing learning media that train scientific literacy skills on the topic of energy sources using Google Sites. Thus, the problem in this research is how

the design, feasibility, and student responses are related to the science literacy-based learning media assisted by Google Sites.

METHOD

The research was conducted in one of the public high schools in South Tangerang City. The research included development research using the 4D development model which was limited to the defining, planning (design) and developing stages. The research was limited to the develop stage because the main focus of this research was to test the feasibility of the media developed before it could be implemented on a wider scale. At the define stage, an initial analysis of students' needs for learning media was carried out, an analysis of the material to be covered in the developed media related to its suitability to the curriculum, and an analysis of student characteristics were carried out. At the design stage, a storyboard of learning media was prepared, media was selected, content and format were prepared, and features that complement the media were selected. At the development stage, validation tests were carried out on 3 media experts, revisions based on validation results and trials on 40 class X students. Students involved in this study were selected using a purposive sampling technique, namely selecting one class X that was considered representative. Figure 1 explains the stages of development that were carried out.

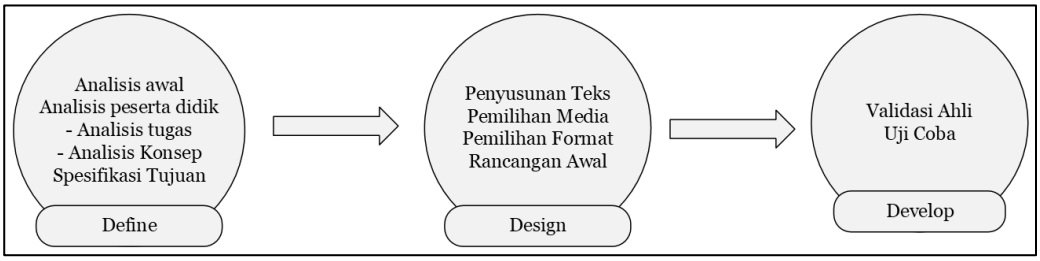

Figure 1. Stages in development

The instruments used in this study include expert validation sheets for science literacy-based learning media, questionnaire instruments to determine student responses to the media developed and test instruments. The expert validation sheet used in this study is the *Learning Object Review Instrument* (LORI) instrument developed by Leacock & Nesbit (2007). The aspects assessed include content quality, alignment of learning objectives, feedback and adaptation, presentation design, accessibility, motivation and reuse. The expert validation questionnaire was analyzed by categorizing each item according to the level of suitability using data conversion in the form of numbers (Rohmad & Sarah, 2021) .

Table 1. Quantitative Data Conversion Classification

Formula	Average Score	Classification
$x > \boldsymbol{x_i} + 1{,}8\ x$ sbi	$x > 4{,}2$	Very good
$\boldsymbol{x_i} + 0{,}6\ x$ sbi $< x \leq \boldsymbol{x_i} + 1{,}8\ x$ sbi	$3{,}4 < x \leq 4{,}2$	Good
$\boldsymbol{x_i} - 0{,}6\ x$ sbi $< x \leq \boldsymbol{x_i} + 0{,}6\ x$ sbi	$2{,}6 < x \leq 3{,}4$	Enough
$\boldsymbol{x_i} - 1{,}8\ x$ sbi $< x \leq \boldsymbol{x_i} - 0{,}6\ x$ sbi	$1{,}8 < x \leq 2{,}6$	Less
$x \leq \boldsymbol{x_i} - 1{,}8\ x$ sbi	$x \leq 1{,}8$	Very Less

The questionnaire validation sheet is used to evaluate responses to learning media used by students using the *User Experience Questionnaire* (UEQ) developed by Schrepp et al., (2017). In the UEQ questionnaire there are 26 question items divided into 6 scales, namely attractiveness, clarity, efficiency, reliability, stimulation and novelty. The response questionnaire is analyzed based on the average value obtained from each question which is grouped based on the value index. The UEQ level categories in the table are as follows (Schrepp et al., 2017) :

Tabel 1. User Experience Questionnaire (UEQ) Categories

Level	Category
> 0,8	Positive Evaluation
- 0,8 to 0,8	Normal Evaluation
< 0,8	Negative Evaluation

The test instrument consists of 10 science literacy questions on energy source material, which have been valid based on the *content validity ratio* (CVR) and *content validity index* (CVI) validation tests. The test instrument is used to determine the improvement of students' science literacy based on the results of the pretest and posttest scores. The measurement results can be calculated using the normal gain test (N-gain test) (Arifah & Rosdiana, 2018) . The calculation of the N-gain test can use the following equation:

$$N - gain = \frac{posttest\ score\ - pretest\ score}{maximal\ score\ - pretest\ score} \times 100 \qquad \ldots (1)$$

The criteria for improving science literacy skills based on N-gain can be explained in the following table (Hake, 1999) :

Tabel 3. N-gain Criteria

Gain factor	Criteria
> 0,7	High
0,3 > 0,7	Medium
< 0,3	Low

RESULT AND DISCUSSION

Expert Validation Results

The media developed in this research are science literacy-based learning media on energy source material assisted *by google sites.* The feasibility of the media can be known by conducting expert validation tests conducted by three science learning media expert lecturers from the science education study program using the *Learning Object Review Instrument* (LORI) instrument. The results of expert validation and their classification are presented in the following table.

Tabel 4. Expert Validation Results

Indicator	Score	Description
Presentation Design	4.03	Good
Interaction Usability	4,10	Good
Accessibility	4,67	Very good
Reusability	4,33	Very good
Content Quality	4,03	Good
Learning Goal Alignment	4,83	Very good
Feedback and Adaptation	4,50	Very good
Motivation	4,00	Good

In the table, each LORI indicator reaches an average score of 4.31, which means that each indicator of science literacy-based learning media on energy source material developed is in the excellent category. This shows that the media that develops the criteria so that it can be used in learning.

User Response Results

Based on the results of the learner response questionnaire, it can be seen that the results of four aspects are above the value of 0.8 with a positive category and one aspect is below 0.8 with a neutral category. This shows that the user experience is quite good when using the developed science literacy-based learning media.

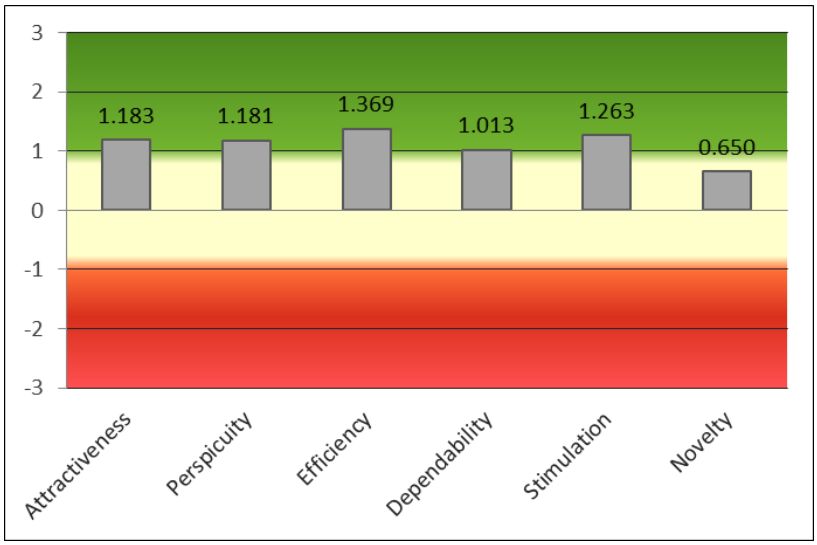

Figure 2. Graph of mean and variance for each aspect of UEQ

Science Literacy Improvement Results

The increase in science literacy is measured based on the results of the pretest and posttest conducted by students with the average N-gain value obtained is 0.3 with a moderate category. Based on the graph, it can be seen that the posttest results obtained have a higher value than each aspect of science literacy. This indicates an increase in science literacy skills in students. The results of the pretest and posttest scores for each aspect of science literacy per indicator can be seen from the following graph.

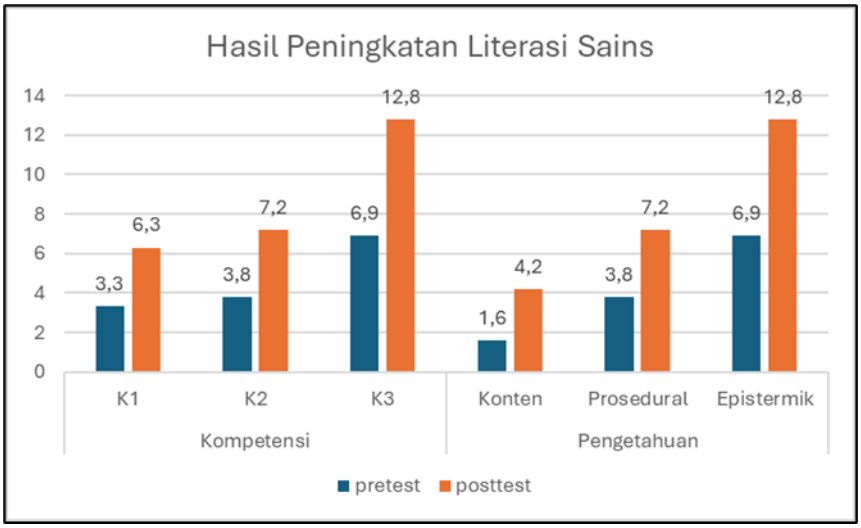

Figure 3. Graphs of pretest and post test results

DISCUSSION

Science literacy-based learning media assisted by *google sites* is made in accordance with the procedures of the 4D development model developed by Thiagarajan. In the *defining* stage, there are initial analysis steps, learner analysis, task analysis, concept analysis and specification of learning objectives. At this stage, researchers conducted interviews with one physics teacher and five students who had studied energy source material to find out the problems experienced during learning. Based on the results of the interview, information obtained that the teacher has utilized media in the form of *power point* in learning. However, based on research Guerid (2020) the use of *power point* in learning, has not been able to train science literacy skills, this affects the role of students who become passive and only listen to learning from the teacher. This affects the interaction of teachers and students in learning. So, the media developed is an interactive media that involves teachers and students in every learning process. Based on research Kristyowati & Purwanto (2019) states that interactive science literacy learning can increase students' activeness in learning.

Science literacy-based learning media assisted by *google sites* is made in accordance with the procedures of the 4D development model developed by Thiagarajan. In the *defining* stage, there are initial analysis steps, learner analysis, task analysis, concept analysis and specification of learning objectives. At this stage, researchers conducted interviews with one physics teacher and five students who had studied energy source material to find out the problems experienced during learning. Based on the results of the interview, information obtained that the teacher has utilized media in the form of *power point* in learning. However, based on research Guerid, (2020) the use of *power point* in learning, has not been able to train science literacy skills, this affects the role of students who become passive and only listen to learning from the teacher. This affects the interaction of teachers and students in learning. So, the media developed is an interactive media that involves teachers and students in every learning process. Based on research Kristyowati & Purwanto (2019) states that interactive science literacy learning can increase students' activeness in learning.

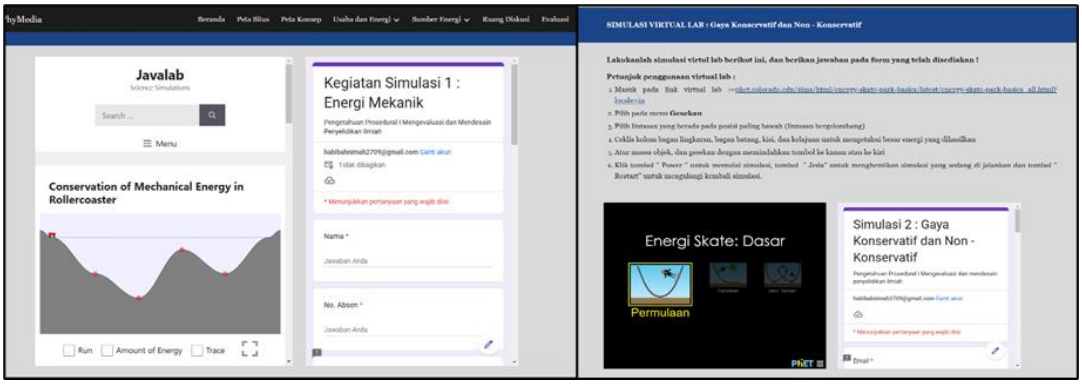

Figure 4. Virtual lab view on the site

This is in accordance with research conducted by Ula & Mariyani (2021) that by developing teaching materials that provide opportunities for students to conduct experiments and find concepts independently, it can increase student activity in the learning process. *Third, the* aspect of interpreting data and evidence scientifically, participants are given stimulus in the form of a graph or table related to the results of the data that has been done, this aims to familiarize students to connect the data and evidence presented. Based on research conducted by Lestari & Setyarsih (2021) the ability to interpret data and evidence scientifically is still in the low category, this is because students are not used to solving problems related to the scientific process. In developing science literacy-based learning media, researchers use tools such as canva to make it easier to create attractive displays and content, *google sites* as learning media sites, *google forms, spreadsheets, mentimeter, padlet, and YouTube* as additional support on the site.

After the define stage is conducted to identify learning needs and constraints, the research moves on to the develop stage that comprises the creation of a media prototype, validation by experts, and testing among students to determine if the media is viable and effective. The testing by experts was carried out by three media expert lecturers. Based on the validation results carried out on all Learning Object Review Instrument (LORI) indicators produced, it is known that the media developed is suitable for use in learning for students. This is also complemented by learning activities on media developed in accordance with learning goals. This is in line with earlier findings, which assert that learning media should be matched to the subject matter and learning goals in order to enhance the learning outcomes of students (Lubis et al., 2023).

Learning media that has been declared feasible by experts, then tested limited to students who act as users. Limited trials were conducted using the *User Experience Questionnaire* (UEQ). According to Intanny et al (2018) *User Experience Questionnaire* (UEQ) is used to measure technical and non-technical aspects related to emotions or user satisfaction. This is in accordance with the statement Schrepp et al (2014) that measuring user responses helps determine clear goals regarding the expected user experience of science literacy media. The efficiency aspect has the highest score with a positive category. While the lowest aspect on the novelty indicator with a neutral category. Thus, science literacy-based learning media assisted by *google sites* received a positive response from students.

From the measurement results of each competency and knowledge aspect, it can be seen that the highest n-gain score is in the competency to interpret data and evidence scientifically, and in the

knowledge aspect in the procedural aspect. Knowledge of appropriate procedural steps in data collection can affect the ability to interpret scientific data and evidence (OECD, 2019) . Supported by previous research conducted by Latip (2022) shows that the factor that influences the ability to interpret data and scientific evidence is a learning process that is oriented towards applying science concepts in the form of data in the form of tables, or graphs to real problems experienced daily. These results show that Google Sites-based media is able to train students' scientific thinking skills, especially in the aspect of data interpretation which is one of the main skills in scientific literacy.

CONCLUSION

The development of science literacy-based learning media on energy source material focuses on aspects of science literacy using the 4D development model. Based on the results of expert validation, the learning media is declared feasible to use. The learning media developed received positive responses from students who had conducted trials and obtained an increase in science literacy skills in students. This study has limitations, including only reaching the Develop stage so it has not been tested on a large scale, and the trial was limited to one class in one school, so the results may be different if applied to a wider group of students with diverse characteristics. Research can be followed up to the disseminate stage or dissemination to a larger number of participants and learning media can be developed on other materials. The media developed has great potential in facilitating students to develop their science literacy skills.

REFERENCES

Afifah, A., Nurohman, S., & Maryanto, A. (2021). The Development of Interactive Learning Media on Android Platform Assisted By Google Sites. *Journal of Science Education Research*, *5*(2), 10–15. https://doi.org/10.21831/jser.v5i2.44288

Amarulloh, R. R. (2022). Pengembangan Media Pembelajaran Fisika. *Jurnal Inovasi dan Pembelajaran Fisika*, *9*(2), 154–164.

Aniashi, S. O., Okaba, L. A., Anake, E. U., & Akomaye, M. U. (2019). Classroom science with everyday life: A means for improving performance in sciences and national development in Nigeria. *International Journal of Science and Technology Education Research*, *10*(3), 25–29. https://doi.org/10.5897/ijster2019.0457

Ardianto, D., & Rubini, B. (2016). Comparison of students' scientific literacy in integrated science learning through model of guided discovery and problem based learning. *Jurnal Pendidikan IPA Indonesia*, *5*(1), 31–37. https://doi.org/10.15294/jpii.v5i1.5786

Arifah, F., & Rosdiana, L. (2018). Peningkatan Literasi Sains Pada Materi Zat Aditif Kelas VIII-C SMP Negeri 21 Surabaya. *Pensa: E-Jurnal Pendidikan …*, *6*(2), 296–299. https://ejournal.unesa.ac.id/index.php/pensa/article/view/24311

Azaly, Q. R., & Fitrihidajati, H. (2021). Pengembangan Media Pembelajaran Berbasis Microsoft Office Sway pada Materi Perubahan Lingkungan untuk Melatihkan Kemampuan Literasi Sains Siswa Kelas X SMA. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *11*(1), 218–227. https://doi.org/10.26740/bioedu.v11n1.p218-227

Azis, T. . (2019). *Strategi pembelajaran era digital. Islami Ilmu Pengetahuan Di Era Revolusi*

Industri 4.0. *Vol 1 (No*(2), 308–318. http://pkm.uika-bogor.ac.id/index.php/ACIEDSS/article/view/512

Fuadi, H., Robbia, A. Z., Jamaluddin, J., & Jufri, A. W. (2020). Analisis Faktor Penyebab Rendahnya Kemampuan Literasi Sains Peserta Didik. *Jurnal Ilmiah Profesi Pendidikan*, *5*(2), 108–116. https://doi.org/10.29303/jipp.v5i2.122

Guerid, F. (2020). Investigating the use of PowerPoint in teaching: a case study at Annaba Higher School of Management Sciences. *Ukrainian Journal of Educational Studies and Information Technology*, *8*(1), 17–27. https://doi.org/10.32919/uesit.2020.01.02

Hake, R. R. (1999). Analyzing change/gain scores. *Unpublished.[online] URL: http://www. physics. indiana. edu/\~ sdi/AnalyzingChange-Gain. pdf*, *16*(7), 1073–1080. http://www.ncbi.nlm.nih.gov/pubmed/22025883%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:ANALYZING+CHANGE/GAIN+SCORES#0%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Analyzing+change/gain+scores#0

Intanny, V., Widiyastuti, I., Dolorosa, M., & Perdani, K. (2018). *Pengukuran Kebergunaan dan Pengalaman Pengguna Marketplace Jogjaplaza . id dengan Metode UEQ dan USE Questionnaire*. *3*(2), 117–126.

Ismawati, I., Mutia, N., Fitriani, N., & Masturoh, S. (2021). Pengembangan Media Pembelajaran Fisika Berbasis Web Menggunakan Google Sites Pada Materi gelombang Bunyi. *Jurnal Ilmiah Mahasiswa Pendidikan Fisika*, *2*(2), 140–146.

Kalyan, K. . (2020). Creating a Library portal by using Google Sites. *Journal of Advances in Library and Information Science*, *9*(1), 46–52.

Ke, L., Sadler, T. D., Zangori, L., & Friedrichsen, P. J. (2021). Developing and Using Multiple Models to Promote Scientific Literacy in the Context of Socio-Scientific Issues. *Science and Education*, *30*(3), 589–607. https://doi.org/10.1007/s11191-021-00206-1

Kristyowati, R., & Purwanto, A. (2019). Pembelajaran Literasi Sains Melalui Pemanfaatan Lingkungan. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, *9*(2), 183–191. https://doi.org/10.24246/j.js.2019.v9.i2.p183-191

Latip, A. (2022). Analisis Kemampuan Literasi Sains Mahasiswa Pada Aspek Kompetensi Sains dalam Perkuliahan Pengenalan Kimia Fisika. *PSEJ (Pancasakti Science Education Journal)*, *7*(2), 68–75. https://doi.org/10.24905/psej.v7i2.129

Latip, A., & Faisal, A. (2021). Upaya Peningkatan Literasi Sains Siswa melalui Media Pembelajaran IPA BerbasisLatip, A., & Faisal, A. (2021). Upaya Peningkatan Literasi Sains Siswa melalui Media Pembelajaran IPA Berbasis Komputer. Jurnal Pendidikan UNIGA, 15(1), 444. https://doi.org/10. *Jurnal Pendidikan UNIGA*, *15*(1), 444–452. http://dx.doi.org/10.52434/jp.v15i1.1179

Lestari, D., & Setyarsih, W. (2021). Analysis of Students' Scientific Literacy Skills and the Relationship with Critical Thinking Skills on Global Warming Materials. *Journal of Physics: Conference Series*, *1805*(1). https://doi.org/10.1088/1742-6596/1805/1/012040

Lubis, L. H., Febrianti, B., Yana, R. F., Azhar, & Drajat, M. (2023). The Impact of Technology on Students' Psychological and Educational Performance. *JISA(Jurnal Informatika dan*

Sains), *6*(1), 91–95. https://doi.org/10.31326/jisa.v6i1.1661

Nurhayati, H., & , Langlang Handayani, N. W. (2020). Jurnal basicedu. Jurnal Basicedu,. *Jurnal Basicedu*, *5*(5), 3(2), 524–532. https://journal.uii.ac.id/ajie/article/view/971

OECD. (2019). PISA 2018 Assessment and Analytical Framework. In *OECD Publishing*.

OECD. (2023). *Pisa 2022 Results The State of Learning and Equity in Education: Vol. I* (Nomor 2).

Rohmad, & Sarah, S. (2021). *Pengembangan Isntrumen Angket* (A. Murtadho (ed.); ke 1).

Schrepp, M., Hinderks, A., & Hannover, A. (2014). *Design, User Experience, and Usability. Theories, Methods, and Tools for Designing the User Experience*. *8517*(January 2015). https://doi.org/10.1007/978-3-319-07668-3

Schrepp, M., Hinderks, A., & Thomaschewski, J. (2017). Construction of a Benchmark for the User Experience Questionnaire (UEQ). *International Journal of Interactive Multimedia and Artificial Intelligence*, *4*(4), 40. https://doi.org/10.9781/ijimai.2017.445

Suparya, I. K., I Wayan Suastra, & Putu Arnyana, I. B. (2022). Rendahnya Literasi Sains: Faktor Penyebab Dan Alternatif Solusinya. *Jurnal Ilmiah Pendidikan Citra Bakti*, *9*(1), 153–166. https://doi.org/10.38048/jipcb.v9i1.580

Suryani, A. I., Jufri, A. W., & Setiadi, D. (2017). Pengaruh Model Pembelajaran 5E Terintegrasi Pendekatan Saintifik Terhadap Kemampuan Literasi Sains Siswa SMPN 1 Kuripan Tahun Ajaran 2016/2017. *Pijar MIPA*, *12*, 39–43.

Ula, W. R. R., & Mariyani, A. (2021). The Development of Guided Inquiry Based Science Basic Concept Teaching Materials. *Journal of Physics: Conference Series*, *1842*(1). https://doi.org/10.1088/1742-6596/1842/1/012079

Yanto, R., Waskito, W., Effendi, H., & Purwanto, W. (2023). Development of Web-Based Learning Media Using Google Sites in Vocational High School Informatics Subjects. *Journal of Vocational Education Studies*, *6*(1), 11–24. https://doi.org/10.12928/joves.v6i1.8027

Yusmar, F., & Fadilah, R. E. (2023). Analisis Rendahnya Literasi Sains Peserta Didik Indonesia: Hasil Pisa Dan Faktor Penyebab. *LENSA (Lentera Sains): Jurnal Pendidikan IPA*, *13*(1), 11–19. https://doi.org/10.24929/lensa.v13i1.283

Ramachandran, A., Ellis, N., & Gladwin, D. (2024). Energy literacy: A review in education. *Journal of Environmental Education*, *55*(3), 191–202. https://doi.org/10.1080/00958964.2023.2283694

Pradana, L. N., Kesmawan, A. P., & Maharani, S. (2019). Energy literacy-based learning activities on female students. *International Journal of Scientific and Technology Research*, *8*(8), 1711–1715.