EDUHUMANIORA: Jurnal Pendidikan Dasar

Journal homepage: https://ejournal.upi.edu/index.php/eduhumaniora/

Development Needs Analysis Science Literacy Assessment Instruments Matchup Type Wordwall Based Earth Change Materials

Riqqah Salsabila Sahmanita[1], Wasino Wasino[2], Yeri Sutopo[3], Wahyu Lestari[4], Deni Setiawan[5]*

[1]Semarang State University Graduate School, Semarang, Indonesia
[2]Faculty of Social and Political Sciences, Semarang State University, Semarang, Indonesia
[3]Faculty of Engineering, Semarang State University, Semarang, Indonesia
[4]Faculty of Languages and Arts, Semarang State University, Semarang, Indonesia
[5]Faculty of Education and Psychology, Semarang State University, Semarang, Indonesia
Correspondence: E-mail: rsahmanita@students.unnes.ac.id

ABSTRACT

Developing scientific literacy assessment instruments on earth change material for elementary school students is important. The development of scientific literacy-based assessment instruments is an effort to measure students' scientific literacy abilities. The research aims to develop a creative and innovative assessment instrument, is matchup. Initial research was used to capture the needs for scientific literacy assessment instruments needed by teachers and students. The needs analysis research method uses qualitative research to collect initial data. Data collection techniques used range from observation, interviews, and documentation. The data is analyzed interactively and effectiveness tests are carried out to obtain the empirical benefits of the tool in the field. Research development on the products produced is done through expert judgment by instrument experts, media experts, and stakeholders (teachers as users). The research showed that the matchup game effectively carried out science learning evaluations. Product analysis is very effectively used in assessment activities in science learning for elementary school students, especially in material regarding changes in the earth caused by humans. Given the development of science literacy assessment instruments that have not been widely developed by teachers in learning.

ARTICLE INFO

Article History:
Submitted/Received 04 Dec 2023
First Revised 28 May 2024
Accepted 26 Jun 2024
First Available online 30 Jun 2024
Publication Date 01 Jul 2024

Keyword:
Assessment instrument,
Scientific literacy,
Wordwall.

1. INTRODUCTION

Literacy is an important thing in world development, especially in facing the 21st century, because 21st-century education now focuses on literacy skills, including the ability to read, speak, listen, and write (Kristiantari et al., 2022). This is because scientific literacy views the importance of thinking and behavioral skills which involve mastering ways of thinking and using a scientific mindset in recognizing and responding to various events in everyday life (Kimianti & Prasetyo, 2019; Pratiwi et al., 2019). High scientific literacy skills can also help answer every complex life challenge (Aswita et al., 2022). According to the Program for International Student Assessment (PISA), scientific literacy is the ability to relate various issues related to science and the idea of science as a reflective society (Summaries, 2019), scientific literacy is one of the parameters for determining the human development index which is influenced by the quality of education in a country (Sutiani et al., 2021). Scientific literacy includes things that are considered important for students to understand the environment, economics, society, health, and technology (Irsan, 2021; Yuliasih & Sarwi, 2020). So it is necessary to measure scientific literacy to determine the extent of students' scientific literacy regarding the scientific concepts they have studied, and can be used as a benchmark for the level of education quality in Indonesia.

Based on the results of observations made on phase C science and science learning activities in class V of SD Negeri 3 Pabuaranwetan with a total of 28 students, in chapter 8 'Bumiku Sayang, Bumiku Malang' topic B "Oh the Environment is So Damaged" the main material of changes in the earth is caused by humans not being per ideal science learning. The use of conventional learning methods is applied by teachers who position students as learning objects, not learning subjects who actively construct the results of their thinking. The learning process carried out also seems like a process of transferring knowledge, this is due to the lack of participation from students because they are not directly involved. Teachers also realize that the teaching resources used are less diverse, because they only rely on teacher books and student books available at school. This problem has an impact on students' scientific literacy abilities, the PISA assessment of aspects of scientific literacy pays special attention to 3 indicators, namely identifying scientific issues, explaining scientific phenomena, and using scientific evidence (Asyhari, 2015). The low level of scientific literacy is one of the inhibiting factors in the development of science and technology. The main goal of developing scientific literacy skills is so that students can understand how to solve problems related to science and technology (Pratiwi et al., 2019). The existing problems show that scientific literacy assessment instruments are urgently needed and need to be developed (Lestari & Setyarsih, 2020).

Dwi et al., (2023) in the research entitled "Validity Test of Moodle-Based Digital Assessment to Measure Science Literacy Skills in Environmental Pollution Material", the results showed that the validation results of Moodle-Based Digital Assessment obtained an average of 94.1% with a very valid category so that Moodle was based on assessment digital meets quality and can be applied to measure students' scientific literacy abilities, especially in environmental pollution material.

Lestari & Setyarsih (2020) in research entitled "Feasibility of Formative Assessment Instruments Based on Students' Scientific Literacy on Global Warming Material". The research results showed that the 16 questions developed were valid and reliable and were able to measure and capture the profile of students' scientific literacy and critical thinking abilities.

Based on the research above, the differences and similarities between the research that will be carried out and the research that has been carried out have been explained. Therefore, the research entitled "Analysis of the Need for Development of a Matchup Type Wordwall-

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

Based Scientific Literacy Assessment Instrument on Earth Change Material" can be carried out because there is a difference from previous studies, namely that it has novelty in the development of a matchup type wordwall game-based scientific literacy assessment instrument, because wordwall is one type of technology that can be used to carry out interesting learning evaluation activities (Fitriani et al., 2019). Students' scientific literacy abilities can be improved in various ways, one of which is an evaluation tool in the form of an assessment instrument that supports teachers in evaluating students' scientific literacy abilities (Novita et al., 2021). The following is a general overview of interactive matchup games, can be seen **Figure 1**.

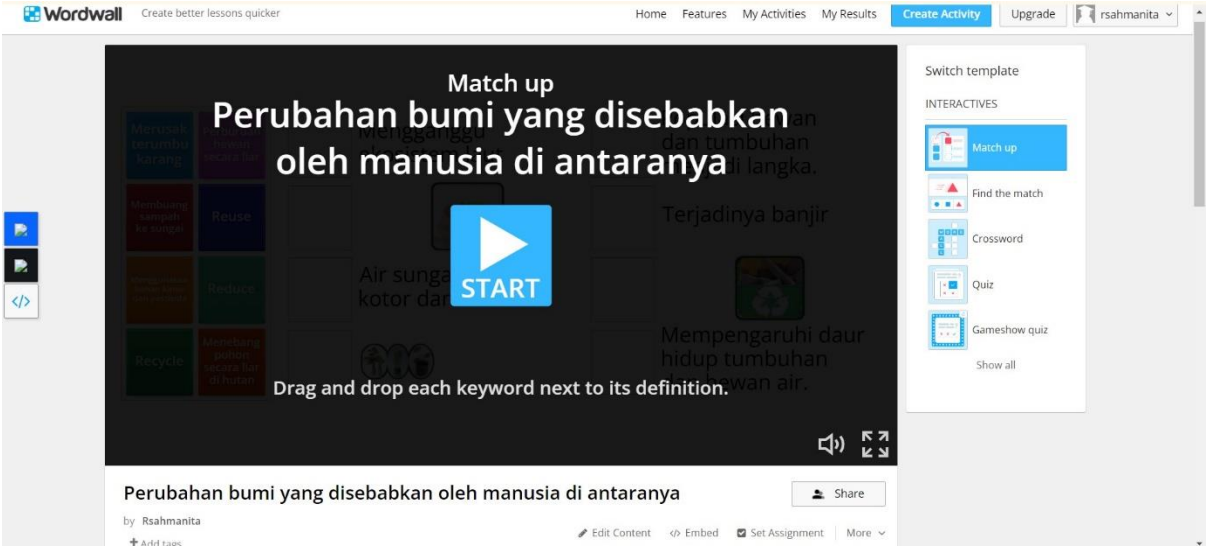

Figure 1. Matchup Game Evaluation Model

Based on **Figure 1**., this research developed a matchup-based scientific literacy assessment instrument which was implemented interactively. Students participate actively as learning subjects because learning activities are packaged in the form of interactive games, and make it easier for students to understand and construct their knowledge. This research is focused on developing a matchup-based scientific literacy assessment instrument with the main material in chapter 8 'Bumiku Sayang, Bumiku Malang' topic B "Oh the Environment is So Damaged" the main material of changes in the earth caused by humans as a science learning resource at elementary school level in class V as well as knowing the matchup-based scientific literacy assessment instrument as an initial needs analysis in science learning. Many studies have been conducted regarding scientific literacy abilities. However, in general, this research has novelty value, because it includes the development of a matchup game-based scientific literacy assessment instrument. This research aims to develop what is the instrument for assessing scientific literacy regarding changes in the earth for elementary school students on the scientific literacy abilities of students in class V.

2. METHODS

The research method used is Research and Development (R&D) with the ADDIE design which stands for Analysis, Design, Development, Implementation, and Evaluation (Branch, 2009). The research location was carried out at SD Negeri 3 Pabuaranwetan, Pabuaran District, Cirebon Regency, with the research location shown in the following map, see **Figure 2**.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

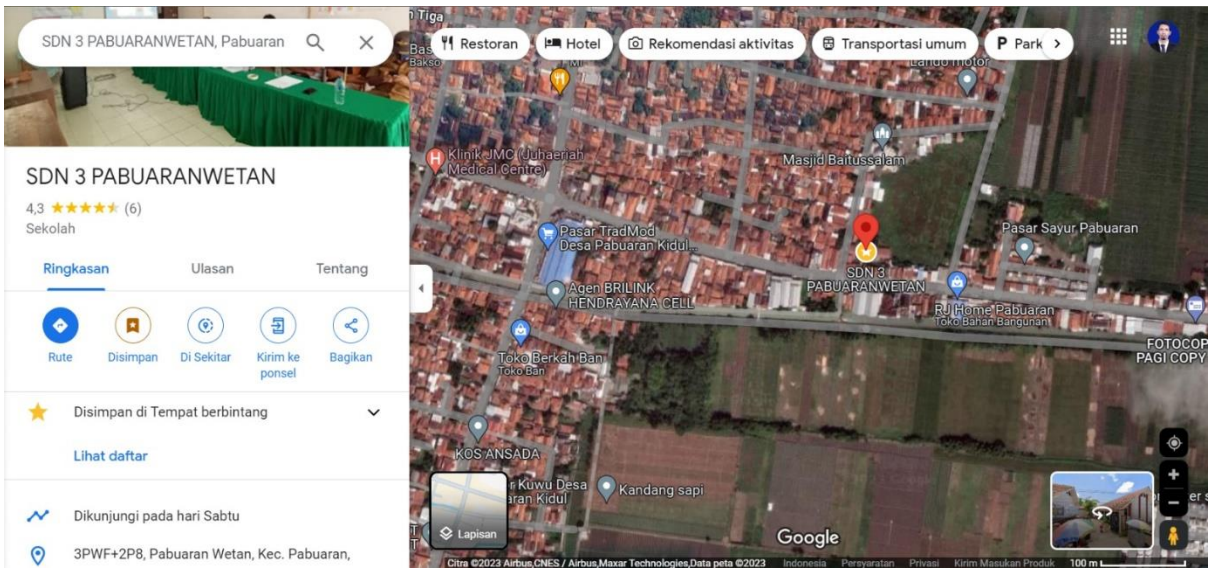

Figure 2. Research Location Map

This research has been carried out starting from October 1 2023 using data collection techniques, namely conducting a preliminary study through direct observation activities to collect information and identify problems that can be used as material for developing assessment instruments. The research instrument used was an observation guide which was used to collect preliminary studies related to the analysis of needs for developing science and technology learning assessment instruments. The data obtained was analyzed using data triangulation techniques.

The needs analysis aims to support the development of assessment instruments used to measure students' abilities in terms of scientific literacy skills through science learning, but to support product development, an assessment instrument is needed which is defined as a tool for developing and producing products (Hidayah & Lestari, 2021). The assessment instrument that was developed was then validated by expert judgment or instrument experts, namely 1 Lecturer in the Basic Education Masters Program at Semarang State University and 1 stakeholder, namely one of the class teachers from SD Negeri 3 Pabuaranwetan, using the validation sheet as an assessment and input which was then revised. The qualitative data obtained was in the form of comments and suggestions which were analyzed descriptively. Meanwhile, quantitative data based on scores obtained from the validation sheet will be converted into percentage form using the following formula calculation (Dwi et al., 2023).

$$V = \frac{Tse}{Tsm} \times 100\%$$

Information:
V = Expert validation (p value percentage)
This = Total empirical score (validation result value)
Tsm = Maximum total score (maximum expected score)

Research data in the form of percentages is used to determine the level of validity of the scientific literacy assessment instrument with the following criteria, see **Table 1**.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

Table 1. Validity Test Criteria

Interval Score	Category
85.01% - 100%	Very valid
70.01% - 85%	Legitimate
50.01% - 70.00%	Not valid
25.00% - 00.00%	Invalid

Source : (Dwi et al., 2023)

Based on Table 1, to find out the instrument validity test criteria, a development stage was carried out starting from instrument validation by expert judgment or instrument experts to obtain logical validity from the material, media, and language domains. Astuti et al., (2014) believes that the development stage begins with validation to obtain content and construct validity so that the results show that the assessment instrument is very suitable for use.

Meanwhile, to calculate the percentage of student responses, use the following formula.

$$K = \frac{F}{N \times I \times R} \times 100\%$$

Information:

K = percentage of eligibility
F = total score of responsesden
N = highest score in the questionnaire
I = number of questions
R = total number of respondents

The following is an explanation of the effectiveness categories used to determine the results of the effectiveness of students' responses to the matchup type wordwall game (see **Table 2**).

Table 2. Student Response Criteria

No	Average Score	Validation Level
1.	81%-100%	Very good
2.	61%-80%	Good
3.	41-60%	Not good
4.	21%-40%	Not good
5.	0%-20%	Very not good

Source : (Widoyoko, 2012)

Based on table 2, the student response criteria are obtained with the average score obtained along with the validation level interpretation categories as well. Effectiveness trials were carried out on 28 class V students of SD Negeri 3 Pabuaranwetan for the 2023/2024 academic year by first packaging the instruments in online form via the worldwall.net website, namely an interactive matchup game to make it easier to work on and check the results of students' answers. The results of the trial were used as an evaluation stage for a matchup-based scientific literacy assessment instrument to describe students' scientific literacy abilities on earth change material.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

3. RESULTS AND DISCUSSION

3.1. Analysis of the Need for the Development of a Science Literacy Assessment Instrument Based on Wordwall Matchup Type Earth Change Material

In this development research activity, the first step taken was to carry out a needs analysis through direct observation of science and science learning activities in class V regarding how to use materials, resources and instruments for assessing students' scientific literacy abilities in the school, then carrying out an analysis of the curriculum and books. The teacher and students' books then analyzed which chapters and topics of material would be used in class V science learning. After that, it was concluded that there was a need to develop a scientific literacy instrument based on matchup type educational web wordwall game media to improve students' scientific literacy skills on earth change material. by humans, the wordwall web educational game media can also be used to help teachers in the learning process (Wandefit et al., 2023).

The validity test of the assessment instrument was carried out by two expert validators consisting of 1 lecturer from the Basic Education Masters Program at Semarang State University and 1 class teacher from SD Negeri 3 Pabuaranwetan using the validation sheet as an assessment as well as input for product improvements. The data results obtained from the validity test of the scientific literacy assessment instrument are as follows **Table 3**.

Table 3. Results of Quantitative Data Validation of Scientific Literacy Assessment Instruments

Assessment Aspects	Validator		Average Score
	V1	V2	
Aspects of Learning Media	46	49	47.5
Learning Material Aspects	48	49	48.5
Linguistic Aspect	47	49	48
Total score	141	147	144
Percentage	94%	98%	
Category	Very Valid	Very Valid	

Table 3 shows that the validation results of the scientific literacy assessment instrument are based on 3 assessment aspects, namely the learning media aspect consisting of 10 assessment items, the learning material aspect consisting of 10 assessment items, and the language aspect consisting of 10 assessment items. The validation results show that the highest score is in the learning material aspect, while the lowest score is in the learning media aspect. However, overall the matchup type wordwall-based scientific literacy assessment instrument is in the very valid category with a percentage of 96%.

After going through expert validation in terms of material, media, and language and through a revision process, the matchup type wordwall-based scientific literacy assessment instrument was carried out in a limited trial using the cluster model, the results of the limited trial carried out on class V students at SD Negeri 3 Pabuaranwetan using the wordwall website with matchup type to determine the level of effectiveness, can be seen in **Table 4** below.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

Table 4. Results of Effectiveness Test Analysis

No	Learners	Score	Category
1	Student 1	7	Very good
2	Student 2	7	Very good
3	Student 3	7	Very good
4	Student 4	7	Very good
5	Student 5	8	Very good
6	Student 6	8	Very good
7	Student 7	8	Very good
8	Student 8	8	Very good
9	Student 9	6	Good
10	Student 10	6	Good
11	Student 11	7	Very good
12	Student 12	7	Very good
13	Student 13	7	Very good
14	Student 14	7	Very good
15	Students 15	7	Very good
16	Student 16	4	Enough
17	Student 17	5	Good
18	Student 18	7	Very good
19	Student 19	7	Very good
20	20 students	8	Very good
21	Student 21	8	Very good
22	Students 22	6	Good
23	Students 23	7	Very good
24	Students 24	7	Very good
25	Students 25	7	Very good
26	Students 26	8	Very good
27	Students 27	8	Very good
28	Students 28	7	Very good
	Total score	196	Very good
	Average	7	

Based on **Table 4**, from the assessment instrument provided in the form of 8 questions packaged in a matchup type wordwall website, the results of the feasibility analysis from the limited trial were obtained with an average interval of 7 with a very good category. Based on the validation results, it was found that the matchup type wordwall-based scientific literacy assessment instrument was suitable for use both in terms of material, media, and language in limited trials so that it could be used for wide-scale implementation in terms of improving students' scientific literacy abilities.

Data on student responses to scientific literacy assessment instruments based on matchup type wordwall games in the research used student response questionnaire sheets to measure qualitative data on the instruments that had been given. Student response data can be seen in **Table 5**.

Table 5. Students Responses

Small Scale Readability Test Subjects	Average score	Category
Small scale readability trial class (5 people)	86%	Very good

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

Based on table 5, students' responses after applying the matchup type wordwall game-based scientific literacy assessment instrument in science learning, especially earth change material, used a questionnaire via Google Form to find out students' responses to the matchup type wordwall game-based scientific literacy assessment instrument that had been implemented. Widoyoko (2012) said that an instrument is said to be practical if its quality score reaches ≥2.60.

The product developed is a matchup-based scientific literacy assessment instrument after being implemented on a large scale and is expected to improve students' scientific literacy abilities, as in previous research conducted by Lestari & Setyarsih (2020) in research entitled "Feasibility of Formative Assessment Instruments Based on Students' Scientific Literacy on Global Warming Material". The research results show that the implementation of a scientific literacy-based formative instrument can significantly improve scientific literacy skills, the 16 questions developed are valid and reliable and can measure and capture the profile of students' scientific literacy and critical thinking abilities. The use of matchups can be used to attract students' attention and motivation towards the issue of changes in the earth caused by human actions.

The results of the validation carried out by expert validators on the scientific literacy assessment instrument developed received a good response from expert validators. Based on the results of the validation sheet analysis, this instrument obtained an average percentage of validation results, namely 96% with a very valid category. So it can be applied for students to measure scientific literacy abilities in learning activities with several revisions from comments and suggestions from expert validators. An instrument can be said to be valid if it can measure the aspect it wishes to measure and can also reveal data from the variables studied (Arikunto, 2015; Dwi et al., 2023; Sugiono (in Ono, 2020). The results of the criticism and suggestions given by the validator stated that the matchup type wordwall-based scientific literacy ability assessment instrument is something new that can be used as an alternative in conducting assessments. This assessment instrument is also stated to be relevant and can be developed, especially to support increasing students' scientific literacy skills.

4. CONCLUSION

Based on the research, it can be concluded that the scientific literacy assessment instrument has gone through the validation stage. From the validation results, the scientific literacy assessment instrument obtained an average of 96% with a very valid category. So that the analysis of the need for scientific literacy assessment instruments has met the quality and can be applied to students to measure students' scientific literacy abilities, especially on earth change material. So it can be said that the matchup type wordwall-based scientific literacy research instrument is very innovative and creative when used in classroom learning activities by students and teachers.

5. ACKNOWLEDGMENT

The researcher would like to thank the Semarang State University lecturers and teachers at SD Negeri 3 Pabuaranwetan who have helped and supported in providing data as well as suggestions and input for this research.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

6. AUTHORS' NOTE

The results of this research have nothing to do with a conflict of interest for any party in the context of publishing this article. Apart from that, the researcher also emphasized that this article is also free from plagiarism.

7. REFERENCES

Arikunto, S. (2015). *Research Procedures: A Practical Approach*. Rineka Cipta.

Astuti, W. P., Prasetyo, A. P. B., & Rahayu, E. S. (2014). Development of an authentic assessment instrument based on scientific literacy on excretory system material. U*NNES Journal, 43*(2), 94–102.

Aswita, D. et al. (2022). *Pendidikan Literasi: Memenuhi Kecakapan Abad 21.* In Literacy Education: Meeting 21st Century Skills. K-Media. https://books.google.co.id/books?id=y3h8EAAAQBAJ&lpg=PA1&ots=ISWF9_5Kha&dq=Aswita%2C D.%2C et.al. (2022). Literacy Education%3A Fulfilling 21st Century Skills. Yogyakarta%3A K-Media.&lr&pg=PA1#v=onepage&q=Aswita, D., et.al. (2022). Literacy Education: Memen

Ashhari, A. (2015). Profile of increasing students' scientific literacy abilities through scientific learning. *Al-Biruni Physics Education Scientific Journal, 4*(2), 179–191. https://doi.org/10.24042/jpifalbiruni.v4i2.91

Branch, R. M. (2009). Approach, instructional design: The ADDIE. In *Department of Educational Psychology and Instructional Technology University of Georgia,* 53(9).

Dwi, A., Permatasari, A., Handayani, D., Siswati, B. H., Sains, M. P., Keguruan, F., & Jember, U. (2023). Journal of Pedagogy: Introduction to Journal of Pedagogy: 655–665.

Fitriani, N., Efendi, I., & Harisanti, B. M. (2019). Development of a science learning module based on local wisdom of sembalun village to improve cognitive learning outcomes of MTS students. *Bioscientist: Biological Scientific Journal, 7*(1), 68. https://doi.org/10.33394/bjib.v7i1.2386

Hidayah, N., & Lestari, W. (2021). Analysis of needs for development of android-based literacy program assessment instruments for Yogyakarta national high school students. *Citizen: Indonesian Multidisciplinary Scientific Journal, 2*(1), 2022. https://doi.org/10.53866/jimi.v2i1.22

Irsan, I. (2021). Implementation of scientific literacy in science learning in elementary schools. *Basicedu Journal, 5*(6), 5631–5639. https://doi.org/10.31004/basicedu.v5i6.1682

Kimianti, F., & Prasetyo, Z. K. (2019). Development of a science e-module based on problem based learning to improve students' scientific literacy. *Kwangsan: Journal of Educational Technology, 7*(2), 91. https://doi.org/10.31800/jtp.kw.v7n2.p1--13

Kristiantari, M. G. R., Wayan, W. I., Tristiantari, N. K. D., & Rediani, N. N. (2022). Impact of prezi media-assisted problem-based learning on scientific literacy and independence of elementary school students. *Journal of Education and E-Learning Research, 9*(3), 184–191. https://doi.org/10.20448/jeelr.v9i3.4185

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457

Lestari, D., & Setyarsih, W. (2020). Feasibility of a formative assessment instrument based on students' scientific literacy on global warming material. I*PF: Innovations in Physics Education, 9*(3), 561–570. https://doi.org/10.26740/ipf.v9n3.p561-570

Wandefit, N. E., Mahmudah, F., Hasanah, D., & Angraini, D. (2023). The effectiveness of using word wall strategy to improve students'writing skill in descriptive text at islamic boarding senior high school an-nur muaro jambi. *JR-ELT (Journal of Research in English Language Teaching), 7*(1), 37-44.

Novita, M., Rusilowati, A., Susilo, S., & Marwoto, P. (2021). Meta-analysis of students' scientific literacy in Indonesia. *Unnes Physics Education Journal, 10*(3), 209–215.

Ono, S. (2020). Validity and reliability test of the sg posture evaluation measuring instrument. *Journal of Physical Therapy, 5*(1), 55–61. https://doi.org/10.37341/jkf.v5i1.167

Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). 21st century science learning with students' scientific literacy. *Journal of Physics Materials and Learning, 9*(1), 34–42.

Summaries, C. E. (2019). What students know and can do. PISA 2009 at a Glance, I. https://doi.org/10.1787/g222d18af-en

Sutiani, A., Situmorang, M., & Silalahi, A. (2021). Implementation of an inquiry learning model with science literacy to improve student critical thinking skills. *International Journal of Instruction, 14*(2), 117–138. https://doi.org/10.29333/iji.2021.1428a

Widoyoko, E. P. (2012). *Learning Program Evaluation*. Learning Library.

Yuliasih, F., & Sarwi. (2020). 21st century skills-based assessment instrument to measure the science literacy abilities of fannie high school students. *UPEJ Unnes Physics Education Journal, 9*(3), 320–330.

DOI: https://doi.org/10.17509/eh.v16i2.64920
p- ISSN 2085-1243 e- ISSN 2579-5457