Check for updates

Description of Teacher Responses to the Implementation of Student Process Skills Portfolio Assessment

Harizon[1], Asrial[2], Haryanto[3], M. Dwi Wiwik Ernawati[4], Dwi Agus Kurniawan[5], Feliza Paramitha Sinaga[6], Rizki Haryati[7]

[1,2,3,4,5,6]Faculty of Teacher Training and Education, Universitas Jambi, Jambi, Indonesia

Article Info

ABSTRACT

Purpose of the study: This research aims to describe the response of science subject teachers to the assessment of students' process skills portfolios.

Methodology: The research method used in this research is mixed, namely a combination of qualitative and quantitative methods. The research design chosen was a sequential explanatory design. This design was selected because quantitative research was carried out first and followed by qualitative methods. This design ensures that the quantitative data obtained is strengthened with qualitative data. Quantitative data analysis techniques are carried out using descriptive statistics. Meanwhile, qualitative data was analyzed based on Miles and Huberman's theory. The instrument used to collect quantitative data is a questionnaire sheet to measure teacher responses in portfolio assessment. Meanwhile, qualitative data was obtained from interviews and documentation studies on relevant problems. The population of this research is schools in Jambi Luar Kota District. The research sample is science subject teachers. The sampling technique used was cluster random sampling.

Main Findings: The results obtained are the teacher's response in State Junior High School 1 Muaro Jambi superior to State Junior High School 1 Atap Pematang Jering.

Novelty/Originality of this study: The urgency of this research is seen from the importance of assessment in learning activities, which is a tool for measuring student abilities and evaluating the education system. The background of this research is limited by the sample involved being only science subject teachers, and the population chosen is the Jambi Luar Kota sub-district.

Corresponding Author:
Harizon,
Faculty of Teaching and Education, Universitas Jambi,
Jl. Lintas Jambi-Ma.Bulian Km.15, 36361, Jambi, Indonesia
Email: harizon.fkip@unja.ac.id

1. INTRODUCTION

Education is the process of transmitting and receiving knowledge, skills, values and culture from one generation to the next. It involves interactions between instructors (teachers, instructors, or mentors) and learners (students, students, or individuals studying) in a structured or informal learning environment [1], [2]. The aim of education is to transfer knowledge, develop skills, develop character and values, promote creativity, form identity, empower individuals and develop critical and analytical skills. [3]–[5]. Education can occur in a variety of contexts, such as formal institutions such as schools and colleges, as well as through informal experiences such as independent learning, job training, and social interactions.

Learning is the process of acquiring new knowledge, skills, understanding, or experience through interaction with information, the environment, or certain situations. It is a way for individuals to broaden their

horizons, develop new skills, and increase their understanding of the world around them [6]. The learning process involves processing information, reflection, and processing new concepts. This can occur in various contexts, both formal and informal [7], [8]. Learning is not limited to the scope of formal education in schools or universities, but also occurs in everyday life, through social interaction, personal exploration, experimentation and problem solving.

The broad learning context both formally and informally needs to be given proper attention. Because, it involves the transfer of knowledge, skills, values, and norms from one generation to the next [9]. It involves various methods, such as teaching, training, teaching and experience. with the aim of developing human potential, preparing individuals to face life's challenges, and forming citizens who contribute positively to society [10]. In the process of student learning in the classroom it is necessary to make rules, policies, and assessments that will be used as a teacher's teaching guide, for example portfolio assessment.

Portfolio assessment is the process of evaluating and determining the value of a collection of works or proof of work from a person that reflects his abilities, achievements and developments in a particular field. Portfolios can contain various types of elements, such as completed projects, artwork, writings, presentations, research results, and so on, depending on the context [11]. The main purpose of a portfolio assessment is to provide a comprehensive picture of a person's work quality or development over a certain period of time [12]. Overall, portfolio assessment has many benefits, including providing a more holistic view of an individual's abilities, encouraging deeper learning, and providing tangible evidence of an individual's achievements and skills.

The use of portfolio assessment itself can be applied in measuring students' process skills. Student process skills are a set of intellectual, cognitive, and metacognitive abilities that enable students to learn effectively, think critically, and overcome challenges in learning and everyday life [13]. These skills are not only limited to mastery of subject matter, but also involve the ability to understand, apply and interact with information in depth. Student process skills have great significance in education and in everyday life. They help students become effective, critical thinking, and independent learners.

Research on portfolio assessment has been carried out by Jannah et al, [14] using a qualitative approach, namely observation, documentation and interviews. The latest research carried out at this time has a new objective, namely assessing student process skills portfolios using a mixed methods approach. The urgency of this research is seen from the importance of assessment in learning activities which is a tool for measuring student abilities and evaluating the education system. With this background, this research is limited by the sample involved being only science subject teachers and the population chosen is the Jambi Luar Kota sub-district. So, the recommendation that can be given to further research is to expand the research population so that the samples involved are sufficient.

2.   RESEARCH METHOD

This research was conducted with mixed methods. Mixed research, also known as mixed methods research, refers to a research approach that combines elements of quantitative and qualitative approaches in one study. The aim is to leverage the strengths of each approach to provide a more comprehensive understanding of the phenomenon under study [15], [16]. The research design used is sequential explanatory which combines quantitative research followed by qualitative research. This design was chosen so that the quantitative data obtained from the research sample was strengthened by qualitative data.

In the context of research, a sample refers to a group of individuals, units, or elements selected from a larger population to represent that population. The population is the entire group from which you want to draw conclusions, while the sample is part of the population that will be a source to observe during the research to make generalizations about the population [17]. Taking a sample is a way of doing research more efficiently and practically than examining the entire population [18]. In many cases, it is simply impossible or impractical to collect data from every individual in the population, so by selecting a representative sample,

The choice of sampling method must consider the research objectives, population characteristics, availability of resources, and the desired level of validity and generalization. The ultimate goal is to ensure that the samples taken can accurately represent the population, so that the research results can have wider relevance. The samples that will be the source of quantitative data can be seen in table 1.

Table 1. Research Sample

Schools	Teachers
State Junior High School 1 Atap Pematang Jering	15 people
State Junior High School 1 Muaro Jambi	15 people

From table 1 it is known that the research sample that will be the source of quantitative data is 30 teachers from 2 different schools, namely State Junior High School 1 Atap Pematang Jering and State Junior High School 1 Muaro Jambi.

Sampling techniques have the aim of creating a representative sample of a larger population. Representativeness means that the sample should reflect the characteristics and variations that exist in the population as a whole. By selecting a representative sample, research results can be expected to be more accurate and generalizations made from the sample can be applied to the entire population. Astalini et al, [19] argues that the objectives of the sampling technique are: (1) reduce costs and time, (2) facilitate the research process, (3) increase accuracy, (4) avoid bias, (5) support generalization, (6) reduce variability.

The sampling technique chosen in this study was cluster random sampling. Cluster Random Sampling is a sampling method that involves dividing the population into groups called clusters, and then some clusters are randomly selected to be sampled. [20]. After the clusters are selected, all members in the selected cluster are taken as a sample. This technique is often used when the population has a complex structure or when it is difficult to access the entire population. Accoarding to Dewi & Agustika, [21]; Nusantari et al. [22] The steps in cluster random sampling are as follows:

1. Population Division: The population is divided into groups called clusters. The population determined to be a cluster is State Junior High School located in Jambi Luar Kota sub-district.
2. Cluster Selection: Several clusters are randomly selected from the entire population of clusters. Usually, the selection of these clusters is done using a simple random method.
3. Sampling within Clusters: After the cluster is selected, all members in the selected cluster are taken as samples. After randomization they were drawn and randomly selected and the results obtained were State Junior High School 1 Atap Pematang Jering and State Junior High School 1 Muaro Jambi.

Sampling within Clusters: After a cluster is selected, all members in the selected cluster are taken as a sample. After randomization they were drawn and randomly selected and the results obtained were State Junior High School 1 Atap Pematang Jering and State Junior High School 1 Muaro Jambi.

A research instrument is a tool or means used to collect data and information needed in a study. This instrument is designed to assist researchers in collecting data systematically and objectively, so that research results become more accurate and reliable. Research instruments can take various forms, depending on the type of research, objectives, and data to be collected.

In this study using 2 different instruments according to the type of research. For quantitative data, the instrument used is a teacher's response questionnaire sheet which will be distributed to teachers to measure portfolio assessment responses for students' process skills. Meanwhile, for qualitative data obtained from interviews and documentation studies with relevant sources and support this research topic. The indicators used in making the questionnaire were adopted from research Poerwanti & Winarni, [11]: (1) presentation, (2) layout, (3) systematic language, (4) presentation attitude, (5) suitability of instruments with indicators, (6) accuracy of instruments with assessment techniques, (7) completeness of instruments, (8) variations instrument. The questionnaire sheets that have been designed will be grouped based on the teacher's achievement category. These categories can be seen in the following table.

Table 2. Category for achieving mathematical process skills

Interval	Category
37 – 45	Very good
28 – 36	Good
19 – 27	Pretty good
10 – 18	Not good
0 – 9	Very not good

The data analysis technique used is descriptive statistical analysis. Descriptive statistics is a branch of statistics that aims to provide an overview and summary of data in a form that is easier to understand and interpret [23]. This method collects, presents, and describes data statistically without drawing conclusions or investigating cause-and-effect relationships [24], [25]. Some analysis results will be grouped into mean, median, mode, range, percentage and frequency [26]. With an understanding of descriptive statistics, one can make initial conclusions about the data and decide whether further analysis is necessary or not.

The research procedure carried out using a sequential explanatory research design which prioritizes quantitative methods and continues with qualitative methods can be seen in the following figure.
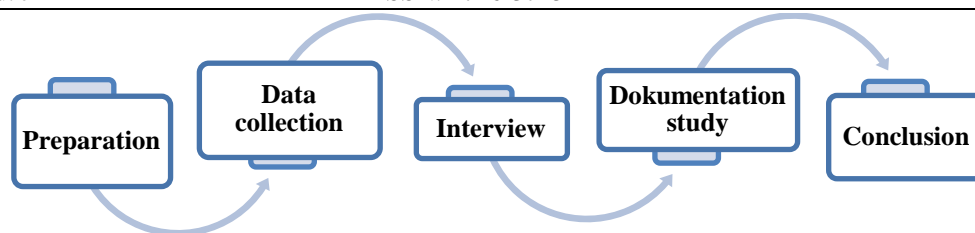
Figure 1. Research Procedure

The first thing to do is make proper preparations. This preparation includes several aspects, namely the place and time of research, determining the objectives and the research samples involved. Designing research instruments and so on. Then proceed with collecting quantitative data by distributing questionnaires, and continuing with interviews as qualitative data and accompanied by documentation studies to strengthen the data obtained based on relevant sources. The final stage is to conclude from the results of the analysis obtained from descriptive statistics.

3. RESULTS AND DISCUSSION

Portfolio assessment can be used in a variety of contexts, including formal education, professional training, art, design and many other fields. This assessment process can be carried out by individuals themselves, lecturers, teachers, superiors, or parties who have authority in the relevant field [27]. Research conducted in Jambi Luar Kota sub-district from 2 different schools get the results presented in the following table.

Table 3. Descriptive results of teacher responses to portfolio assessments for student process skills

Schools	Interval	Category	F	Mean	Median	Min	Maks	%
	37 - 45	Very good	10					73.5
State Junior	28 - 36	Good	5					26.5
High School 1	19 – 27	Pretty good	0	41.09	39.32	30	42	0
Atap Pematang	10 – 18	Not good	0					0
Jering	0 - 9	Very not good	0					0
	37 - 45	Very good	13					89.4
State Junior	28 - 36	Good	2					10.6
High School 1	19 – 27	Pretty good	0	41.21	40.00	32	44	0
Muaro Jambi	10 – 18	Not good	0					0
	0 - 9	Very not good	0					0

From the table above it can be seen that the teacher's response to the portfolio assessment for students' process skills is State Junior High School 1 Atap Pematang Jering in the very good category with a percentage of 73.5% and in the good category as much as 26.5%. Meanwhile, the teacher's response to portfolio assessment for students' process skills in State Junior High School 1 Muaro Jambi in the very good category with a percentage of 89.4% and in the good category as much as 10.6%. This proves that the teacher's response in State Junior High School 1 Muaro Jambi superior to the portfolio assessment compared State Junior High School 1 Atap Pematang Jering.

Portfolio assessment is an evaluation process that involves compiling, reviewing, and evaluating works, projects, or proof of work organized into a portfolio. This portfolio can contain various types of elements, such as writing, projects, artwork, presentations, and so on, which reflect individual abilities, achievements, and development in a particular field or context [28]. According to the opinion of [29] the main purpose of portfolio assessment is:

1. Measuring Abilities and Achievements: Portfolio assessment is used to evaluate the extent to which individuals have achieved set goals or reflect the abilities possessed in a field.
2. Provide Concrete Evidence: Portfolios provide concrete evidence of an individual's quality and level of achievement. This allows the appraiser to see the actual results of the work.
3. Describe Progress: By involving work from various times, portfolio assessment can also describe an individual's progress and development over a certain period of time.
4. Assess Skills and Understanding: Portfolio assessments can help assess an individual's specific skills, conceptual understanding, and critical thinking abilities reflected in his or her work.
5. Focus on Deep Learning: The process of compiling a portfolio can encourage individuals to engage in deep reflection and analysis of their own work, promoting deeper learning and better understanding.
6. Holistic Assessment: Portfolio assessment can provide a more holistic view of an individual, as it covers different types of work and aspects that reflect their abilities.

7. Providing Valuable Feedback: The portfolio assessment process usually involves in-depth feedback, which can help the individual understand strengths and areas for improvement in their work.
8. Portfolio Development: For students, portfolio assessments are also an opportunity to develop a portfolio that can be used in an educational or professional context to demonstrate their abilities to interested parties, such as lecturers, potential employers, or admissions institutions.

Portfolio assessment has much importance in various contexts, both in education and the professional world. The following are several reasons why portfolio assessment is important, explained by [30]:

1. Measurement of Progress and Achievement: Portfolio assessment makes it possible to measure an individual's progress over time. It provides a concrete picture of how a person has developed in a particular area or skill.
2. Assess Actual Skills: In many cases, portfolio assessments reflect an individual's actual abilities and skills because they are based on actual work produced, not just the results of a particular test or exam.
3. Encourages Active Learning: The process of compiling a portfolio encourages individuals to actively engage in reflection, analysis, and selection of relevant work. This promotes deeper learning than simply memorizing information.
4. Wider Context: Portfolio assessments allow individuals to demonstrate multiple aspects of their work, including complex and contextual projects. This allows the recipient of the assessment to view the work in a wider context.
5. Recognition of Diversity of Work: Along with the previous point, portfolio assessment allows individuals to showcase different types of work, highlighting diverse creativity, skills and interests.
6. Develop Metacognitive Skills: The process of compiling a portfolio involves in-depth reflection on the process and results of the work. It helps individuals develop metacognitive skills, namely the ability to understand and manage their own thought processes.
7. Career Preparation: In the professional world, portfolios are often used to demonstrate skills and achievements to potential employers or clients. A strong portfolio can provide a competitive advantage in seeking employment or business opportunities.
8. Holistic Approach to Evaluation: Portfolio assessment makes it possible to look at the individual as a whole, not just as the result of a single test or assignment. This can result in fairer and more accurate assessments.
9. Improved Feedback: In portfolio assessment, more detailed and contextual feedback can be provided to individuals. This helps in their understanding of strengths and areas that need improvement.
10. Increased Motivation and Engagement: The process of compiling a portfolio can be an opportunity for individuals to feel more involved and in control of their learning or work, which in turn can increase motivation.

Overall, portfolio assessment has many benefits, including providing a more holistic view of an individual's abilities, encouraging deeper learning, and providing tangible evidence of an individual's achievements and skills. Based on the opinion of [31] , this concrete evidence can also show that students have various process skills, namely: (1) critical thinking, (2) problem solving, (3) metacognitive abilities, (4) active learning, (5) adapting to new situations, (6) communication effectiveness, (7) collaboration, (8) research and analysis, (9) organization and time management, (10) technology and information skills. Students' process skills are an important foundation for lifelong learning and success in various aspects of life. This helps students not only understand the subject matter, but also develop deep and relevant thinking skills in facing the challenges of the modern world.

4.   CONCLUSION
Based on the results that have been processed through descriptive statistical analysis, it can be concluded that the teacher's response to the portfolio assessment of students' process skills at State Junior High School 1 Muaro Jambi is superior in portfolio assessment compared to State Junior High School 1 Atap Jering.

ACKNOWLEDGEMENTS

REFERENCES
[1] M. Listyawati, "Pengembangan perangkat pembelajaran ipa terpadu di smp," *J. Innov. Sci. Educ.*, vol. 1, no. 1, pp. 61–68, 2012. https://journal.unnes.ac.id/sju/index.php/jise/article/view/46
[2] R. Tanjung, Y. Supriani, A. Mayasari, and O. Arifudin, "Manajemen mutu dalam penyelenggaraan pendidikan," *J. Pendidik. Glas.*, vol. 6, no. 1, pp. 29–36, 2022, doi: 10.32529/glasser.v6i1.1481.

[3] L. Anggraini and R. Perdana, "Deskripsi sikap siswa pada mata pelajaran fisika di sekolah menengah pertama," *Pancasakti Sci. Educ. J.*, vol. 4, no. 2, pp. 83–96, 2019, doi: 10.24905/psej.v4i2.1340.

[4] M. Marisa, "Inovasi kurikulum 'merdeka belajar' di era society 5.0," *Santhet (Jurnal sejarah, Pendidiikan dan Humaniora)*, vol. 5, no. 1, pp. 66–78, 2021, doi: 10.36526/js.v3i2.e-ISSN.

[5] J. P. Casquilho, F. P. Sinaga, N. Septiani, S. W. Oktavia, N. N. Qoidah, and E. F. S. Rini, "The influence of critical thinking ability on students' science learning outcomes," *Edufisika J. Pendidik. Fis.*, vol. 8, no. 2, pp. 116–124, 2023, doi: 10.59052/edufisika.v8i2.24865.

[6] G. C. S. Dwiqi, I. G. W. Sudatha, and A. I. W. I. Y. Sukmana, "Pengembangan multimedia pembelajaran interaktif mata pelajaran ipa untuk siswa sd kelas V," *J. EDUTECH Univ. Pendidik. Ganesha*, vol. 1, no. 1, p. 33, 2019, doi: https://doi.org/10.23887/jeu.v8i2.28934.

[7] M. Taufik, N. S. Sukmadinata, I. Abdulhak, and B. Y. Tumbelaka, "Desain model pembelajaran untuk meningkatkan kemampuan pemecahan masalah dalam pembelajaran ipa (fisika) sekolah menengah pertama di kota Bandung," *Berk. Fis.*, vol. 13, no. 2, pp. 31–44, 2010.

[8] S. Sulfasyah and J. Arifin, "Implikasi pendidikan nonformal pada remaja," *Equilib. J. Pendidik.*, vol. 4, no. 2, pp. 1–8, 2016, doi: 10.26618/equilibrium.v4i2.506.

[9] A. Rahman, S. A. Munandar, A. Fitriani, Y. Karlina, and Yumriani, "Pengertian pendidikan, ilmu pendidikan dan unsur-unsur pendidikan," *Al Urwatul Wutsqa Kaji. Pendidik. Islam*, vol. 2, no. 1, pp. 1–8, 2022.

[10] C. Sarah, I. N. Karma, and A. N. K. Rosyidah, "Identifikasi faktor yang mempengaruhi minat belajar siswa pada mata pelajaran matematika di kelas v gugus Iii Cakranegara," *Prog. Pendidik.*, vol. 2, no. 1, pp. 13–19, 2021, doi: 10.29303/prospek.v2i1.60.

[11] J. I. S. Poerwanti and R. Winarni, "Pelatihan dan pendampingan merancang instrumen assessment for learning berbasis portofolio pada guru-guru sekolah," *J. Widya Laksana*, vol. 10, no. 1, pp. 44–51, 2021, doi: 10.23887/jwl.v10i1.28423.

[12] M. M. Idris and A. Asyafah, "Penilaian autentik dalam pembelajaran pendidikan agama islam," *J. Kaji. Perad. Islam*, vol. 3, no. 1, pp. 1–9, 2020, doi: 10.47076/jkpis.v3i1.36.

[13] Y. Yuanita and F. Yuniarita, "Pengembangan Petunjuk Praktikum Ipa Berbasis Keterampilan Proses Untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar," *Profesi Pendidik. Dasar*, vol. 1, no. 2, p. 139, 2018, doi: 10.23917/ppd.v1i2.6608.

[14] M. Jannah, Sukiman, and Na'imah, "Kajian Sistem Penilaian Portofolio Berdasarkan Kompetensi Pedagogik Guru," *Aulad J. Early Child.*, vol. 5, no. 1, pp. 105–110, 2022, doi: 10.31004/aulad.v5i1.273.

[15] M. D. W. Ernawati, Sudarmin, Asrial, D. Muhammad, and Haryanto, "Creative thinking of chemistry and chemistry education students in biochemistry learning through problem based learing with scaffolding strategy," *J. Pendidik. IPA Indones.*, vol. 11, no. 2, pp. 282–295, 2022, doi: 10.15294/jpii.v11i2.33842.

[16] S. W. Oktavia, N. Septiani, F. Sinaga, and N. N. Qoidah, "Analysis of the relationship in learning interest to learning outcomes static fluid material in senior high school," *J. Ilm. Ilmu Terap. Univ. Jambi*, vol. 7, no. 1, pp. 22–26, 2023, doi: https://doi.org/10.22437/jiituj.v7i1.26696.

[17] A. A. Jeheman, B. Gunur, and S. Jelatu, "Pengaruh pendekatan matematika realistik terhadap pemahaman konsep matematika siswa," *Mosharafa J. Pendidik. Mat.*, vol. 8, no. 2, pp. 191–202, 2019, doi: 10.31980/mosharafa.v8i2.454.

[18] D. Firmansyah and Dede, "Teknik pengambilan sampel umum dalam metodologi penelitian: Literature review," *J. Ilm. Pendidik. Holistik*, vol. 1, no. 2, pp. 85–114, 2022, doi: 10.55927/jiph.v1i2.937.

[19] A. Astalini and D. A. Kurniawan, "Pengembangan instrumen sikap siswa sekolah menengah pertama terhadap mata pelajaran IPA," *J. Pendidik. Sains*, vol. 07, no. 1, pp. 1–7, 2019.

[20] L. N. Zulfa and H. Haryanto, "Pengaruh media macromedia flash terhadap literasi sains dan sikap demokratis mahasiswa," *J. Pendidik. Sains Indones.*, vol. 9, no. 1, pp. 52–64, 2021, doi: 10.24815/jpsi.v9i1.18266.

[21] N. P. W. P. Dewi and G. N. S. Agustika, "Efektivitas pembelajaran matematika melalui pendekatan pmri terhadap kompetensi pengetahuan matematika," *J. Penelit. dan Pengemb. Pendidik.*, vol. 4, no. 2, p. 204, 2020, doi: 10.23887/jppp.v4i2.26781.

[22] E. Nusantari, R. Utina, A. S. Katili, Y. Tamu, and I. Damopolii, "Effectiveness of environmentally-based science learning towards environmentally-friendly character of students in coastal area," *Int. J. Instr.*, vol. 13, no. 3, pp. 233–246, 2020, doi: 10.29333/iji.2020.13316a.

[23] N. Jannah, M. Hidayat, and R. Dani, "Identifikasi kompetensi pedagogik mahasiswa semester vii program studi pendidikan fisika universitas jambi tahun akademik 2019 / 2020," *J. Pendidik. Fis. Tadulako Online*, vol. 8, no. 1, pp. 102–107, 2020.

[24] R. R. Anderha and S. Maskar, "Pengaruh Kemampuan Numerasi Dalam Menyelesaikan Masalah Matematika Terhadap Prestasi Belajar Mahasiswa Pendidikan Matematika," *J. Ilm. Mat. Realis.*, vol. 2, no. 1, pp. 1–10, 2021, doi: 10.33365/ji-mr.v2i1.774.

[25] P. R. Amnuel, F. P. Sinaga, and F. R. Winda, "Description of students' critical thinking ability of urban school in physics material," *Edufisika J. Pendidik. Fis.*, vol. 8, no. 2, pp. 217–225, 2023, doi: 10.59052/edufisika.v8i2.26531.

[26] M. D. W. Ernawati, D. Muhammad, A. Asrial, and M. Muhaimin, "Identifying creative thinking skills in subject matter

bio-chemistry," *Int. J. Eval. Res. Educ.*, vol. 8, no. 4, pp. 581–589, 2019, doi: 10.11591/ijere.v8i4.20257.

[27]   M. Makhrus, A. Harjono, A. Syukur, S. Bahri, and Muntari, "Analisis rencana pelaksanaan pembelajaran (rpp) terhadap kesiapan guru sebagai 'role model' keterampilan abad 21 pada pembelajaran ipa smp," *J. Penelit. Pendidik. IPA*, vol. 5, no. 1, pp. 66–72, 2019, doi: 10.29303/jppipa.v5i1.171.

[28]   N. Mediartika and N. Aznam, "Pengembangan instrumen penilaian portofolio berbasis multiple intelligence untuk mengukur kemampuan berpikir kritis dan sikap ilmiah," *J. Inov. Pendidik. IPA*, vol. 4, no. 1, pp. 52–63, 2018.

[29]   M. Ichwan, "Pengembangan instrumen penilaian portofolio mata pelajaran bahasa indonesia pada kurikulum tingkat satuan pendidikan smp kelas vii semester ganjil," *J. Ilmu Manaj.*, vol. 1, no. 1, pp. 0–216, 2012.

[30]   V. S. Kurnila, M. Badus, E. Jeramat, and G. P. Ningsi, "Peningkatan kemampuan literasi matematika melalui pendekatan problem based learning bermuatan penilaian portofolio," *Euler J. Ilm. Mat. Sains dan Teknol.*, vol. 10, no. 1, pp. 88–97, 2022, doi: 10.34312/euler.v10i1.13963.

[31]   N. W. Y. Anggreni and G. N. S. Agustika, "Model pembelajaran problem based learning berbasis penilaian portofolio terhadap kompetensi pengetahuan matematika," *J. Ilm. Pendidik. Profesi Guru*, vol. 3, no. 1, pp. 61–72, 2020, doi: 10.23887/jippg.v3i1.26814.