

Teachers' Perception and Readiness Toward IPAS Learning Implementation of the Merdeka Curriculum

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Abstract

This qualitative descriptive research aims to explore teachers' perceptions and preparedness for implementing the IPAS learning approach in the context of the MC. The subjects of this study were 87 elementary school teachers in Bekasi District who were selected through a purposive random sampling technique. Data collection was carried out through observation, interviews, and questionnaires. The collected data were then analyzed using interactive qualitative data analysis techniques, including data collection, presentation, and conclusions drawing. The results show that teacher readiness in the curriculum structure understanding is 24% in the high category, 69% medium, and 7% low. In lesson plan aspect, 27% are in the high category, 67% medium, and 6% low category. In the aspect of understanding of differentiated learning, 32% are in the high category, 55% medium, and 13% low. In terms of understanding of P5, 24% are in the high category, 63% medium, and 13% low. Regarding understanding of the Merdeka Mengajar platform, 18% in high category, 44% medium, and 38% low. Teachers' understanding regarding the IPAS assessment are 55% in the high category, 42% medium, and 3% low. Teachers are quite ready to organize science learning in MC implementation and show positive perception.

Keywords: teachers' perception, teachers' readiness, IPAS learning, merdeka curriculum

Abstrak

Penelitian deskriptif kualitatif ini bertujuan untuk menganalisis kesiapan guru dalam pelaksanaan pembelajaran IPAS pada implementasi kurikulum merdeka di sekolah dasar. Subjek penelitian ini meliputi 87 guru sekolah dasar di Kabupaten Bekasi yang dipilih melalui teknik *Purposive Random Sampling*. Data dikumpulkan melalui observasi, wawancara, dan angket. Data yang terkumpul kemudian dianalisis dengan menggunakan teknik analisis data kualitatif interaktif meliputi pengumpulan data, penyajian data, dan penarikan simpulan. Hasil penelitian menunjukkan bahwa kesiapan guru pada aspek pemahaman struktur kurikulum 24% pada kategori tinggi, 69% kategori sedang, dan 7% kategori rendah. Pada aspek perencanaan pembelajaran 27% berada pada kategori tinggi, 67% sedang, dan 6% rendah. Pada aspek pemahaman tentang pembelajaran terdiferensiasi 32% berada pada kategori tinggi, 55% sedang, dan 13% rendah. Pada pemahaman tentang P5 sebanyak 24% pada kategori tinggi, 63% sedang, dan 13% rendah. Berkaitan dengan pemahaman platform merdeka mengajar 18% berada pada kategori tinggi, 44% sedang, dan 38% rendah. Pemahaman guru berkaitan dengan assesmen pembelajaran IPAS 55% kategori tinggi, 42% sedang, dan 3% rendah. Guru sudah cukup siap menyelenggarakan pembelajaran IPAS dalam implementasi kurikulum merdeka dan menunjukkan persepsi yang positif terkait implementasi kurikulum merdeka.

Kata kunci: persepsi guru, kesiapan guru, IPAS, kurikulum merdeka



INTRODUCTION

One of the essential modifications in implementing the Merdeka Curriculum (MC) for elementary schools is merging science and social science content into the natural and social sciences or IPAS. Combining these two studies aimed to facilitate the stages of students' thinking skills which are simple, concrete, holistic, and comprehensive (Kemdikbud, 2022). This encourages students to take a more comprehensive view of the natural and social environment, enabling them to manage it effectively. So that learning is more contextual and applicable to foster scientifically literate communities as the main goal of the IPAS learning (Ahied et al., 2020; Queiruga-Dios et al., 2020). A scientifically literate society means a generation that can be able to use scientific knowledge to solve everyday life problems related to health, technology, environment, and sustainability wisely and rationally (Al Sultan et al., 2018; Noor, 2020; Pratiwi et al., 2019; Tiro et al., 2020). A scientifically literate society is important for social, economic, and environmental progress. They contribute to sustainable decision-making, support innovation and technological development, also participate in science-related issues and policies. IPAS has a strong connection to nature and human interaction. The two cannot be separated because solving various problems in social life requires a scientific background.

A way to gauge the effectiveness of IPAS learning is by evaluating the level of scientific literacy achieved by students (Chen et al., 2021; Muyassaroh & Herianingtyas, 2023; Queiruga-Dios et al., 2020; Rachmatullah et al., 2018). Scientific literacy is a benchmark of the high and low quality of education in a country (Rubini et al., 2016; Vieira & Tenreiro-Vieira, 2016). Low students' scientific literacy problems are still a major problem in various countries, including Indonesia. Based on the results of one of the largest surveys of scientific literacy skills conducted by PISA (OECD, 2019), as many as 78% of students from 72 countries participating in the survey were at level 2 of 6 levels of scientific literacy. In Indonesia, as many as 60% of students are below the minimum scientific literacy competency. At the elementary school level, the achievement of students' scientific literacy skills is measured through TIMSS, where Indonesia has participated in 1999, 2003, 2007, 2011, and 2015 showing consistent results that students' scientific literacy abilities are still low below the international average (Hadi & Novaliyosi, 2019; IEA, 2015). Similar to TIMSS and PISA results, many studies also confirm the low scientific literacy of students at various levels of education (Ahied et al., 2020; Faisal & Martin, 2019; Jufriida et al., 2019; Muyassaroh & Mukhlis, 2023; Ratini et al., 2018; Rubini et al., 2016; Rusilowati et al., 2016). Based on these results, it is natural that there are still many problems related to the lack of environmental awareness and public distrust regarding various health issues, diseases, and vaccinations in daily life.

One of the main factors causing students' low scientific literacy lies in the learning process (Adriyawati et al., 2020; Nurhanifah & Diah Utami, 2023; Siagian et al., 2017). Curriculum changes are frequently aimed at improving the quality of the learning process (Lestari, 2023; Wijayanti & Intan Nur Ngazizah, 2023). Curriculum changes have been made many times but still have not significantly improved. Regarding relevance, curriculum changes are necessary, but teachers' readiness to adapt is often the main obstacle (Asnawi et al., 2022). Ensuring teacher readiness in accomplishing learning is crucial because teacher readiness determines the success of the learning (Ardianti & Amalia, 2022; Purani & Putra, 2022). Teachers with high readiness positively impact learning outcomes (Tuasikal et al., 2021). There have been a considerable amount of studies conducted on teachers' readiness and perceptions in MC implementation, such as on differentiated learning (Digna et al., 2023; Mabsutsah et al., 2023), English learning (Tricahyati1 & Zaim, 2023), Arabic learning (Rois et al., 2023), and civic education (Fahmi et al., 2023). Research exploring teachers' perceptions and readiness in implementing IPAS learning in the MC at the elementary school level has yet to be examined. However, teacher readiness and perceptions in IPAS learning are very

important to explore to identify and overcome possible obstacles and establish effective solutions.

Based on some of these problems, this study aims to analyze the perceptions and readiness of teachers in implementing IPAS learning in the MC in elementary schools. The focus on learning IPAS is taken considering that combining learning science and social studies into science is something new and one of the essential changes in implementing the independent curriculum in elementary schools. This study's results are expected to improve the quality of IPAS learning in elementary schools and encourage more effective and relevant educational reform.

METHOD

This qualitative descriptive study analyzes teacher perceptions and readiness to implement IPAS learning in the MC in elementary schools. Descriptive qualitative research is a procedure in research that produces descriptive data in the form of written or spoken words from the behavior of people who can be observed (Moleong, 2017). The subjects of this study included 87 elementary school teachers in Bekasi District who were selected through a purposive random sampling technique. The background of the research sample based on the school category's origin is detailed in Table 1 below.

Table 1. Background Of The Participant's School Category

No	School Category	Participants	Percentage
1.	Mandiri Belajar	46	52.9%
2.	Mandiri Berubah	9	10.3%
3.	Mandiri Berbagi	7	8%
4.	Sekolah Penggerak	25	28.7%

Data were collected through observation, interviews, and questionnaires. The instruments used include observation sheets, interview guidelines, and questionnaires. The questionnaire consists of 56 closed questions and 3 open questions to measure the level of teacher understanding and teacher readiness regarding curriculum structure, lesson planning, learning processes, teaching materials and infrastructure, and assessment. The observation sheet used is in the form of anecdotal notes. The interview guide is in the form of a list of semi-structured questions. Data validity was carried out by technical triangulation. The collected data were then analyzed using interactive qualitative data analysis techniques, including data reduction, data display, and conclusions drawing/verification (Miles & Huberman, 2014).

The questionnaire used to collect data consists of questions pertaining to some aspects related to curriculum structure, lesson planning, learning processes, teaching materials, infrastructure, and assessment. The framework for the research instrument in this study is presented in Table 2.

Table 2. The Framework for The Research Instrument

Aspects	Indicators	Number of items
Curriculum Structure	a. elementary school phases	3
	b. Intracurricular activities of IPAS learning	4
	c. P5 in IPAS context	4
Lesson Plan Making	a. Learning outcomes (CP) understanding	3
	b. Learning objectives (TP) arrangement	3
	c. Learning objectives flow (ATP) making ability	3
	d. Learning organization	2

	e. Lesson plan/teaching modules	3
	f. P5	2
	g. Assessment planning	3
Learning Processes	a. New Paradigm learning	3
	b. Differentiated learning	4
	c. PjBL	2
	d. Reflective learning	3
	e. P5 Implementation	3
Learning materials, Facilities, and infrastructure	a. Learning materials	2
	b. Facilities and Infrastructure	3
Learning Assessment	a. Diagnostic Assessments	2
	c. Formative Assessment	2
	d. Summative Assessment	2
Total Number of Items		56

The total scores for each aspect are categorized into 3 classifications by referring to the 3 data categorization formula table in Table 3 Below (Azwar, 2012).

Table 3. The formula for finding 3 data categorizations

The formula finding 3 data categorizations	
Low	$X < M-1SD$
Moderate	$M-1SD \leq X < M+1SD$
High	$M+1SD \leq X$

With,

X = total score

M = mean

SD = standard deviation

After being classified according to category, the frequency distribution for each aspect is then presented in diagram form.

RESULT AND DISCUSSION

The MC is designed to be simpler, more flexible, and focus on essential and contextual matters. The MC offers a flexible yet structured framework for attaining student objectives as a Pancasila student profile (Lestari et al., 2022). In this way, neither students nor teachers are overwhelmed by curriculum requirements. There are four essential modifications in implementing the MC for elementary schools: (1) merging of science and social science content into the natural and social sciences or IPAS, (2) integration of computational thinking in mathematics, IPAS, and Indonesian subjects, (3) English as elective subjects, and 4) projects to strengthen the students' Pancasila profile or P5 (Kemdikbud, 2022; Nurani et al., 2022). Teacher readiness in curriculum implementation includes planning, implementation, and evaluation (Kirom, 2017; Ramadhan & Meilana, 2022). This study reviewed several indicators to assess teachers' preparedness in implementing IPAS learning through the MC. These indicators include understanding the curriculum structure, lesson planning, learning processes, teaching materials, facilities and infrastructure, and learning assessment. Each indicator is described as follows.

Understanding of Curriculum Structure

The MC typically includes intra-curricular and co-curricular activities that enhance the profile of Pancasila students and extra-curricular activities (Kemendikbudristek, 2022; Nahdiyah et al., 2022). The elementary school has three phases: A for grades I and II, B for grades III and IV, and C for grades V and VI. The MC implementation offers more flexibility than the 2013 curriculum. Teachers have the option to use either a subject-based or thematic approach. In addition, the total study time is allocated for one year and includes weekly implementation suggestions. Therefore, teachers do not burden by daily targets, such as those outlined in the 2013 curriculum. The P5 also has a specific time to ensure successful implementation and exploration of real-world issues within the surrounding environment and collaboration to solve these problems.

Regarding the MC structure, teachers already understand the essentials. They have attended some training related to MC and understood the intra-curricular and P5 implementation characteristics. As well in IPAS learning implementation, teachers have understood well the time allocation, learning achievement, and its integration in P5. Teachers must understand the structure of the curriculum and its components to carry out learning optimally. Even though, in practice, the teacher still needs enough time to adapt. The level of teacher understanding regarding the MC structure based on survey results is presented in Figure 1 below.

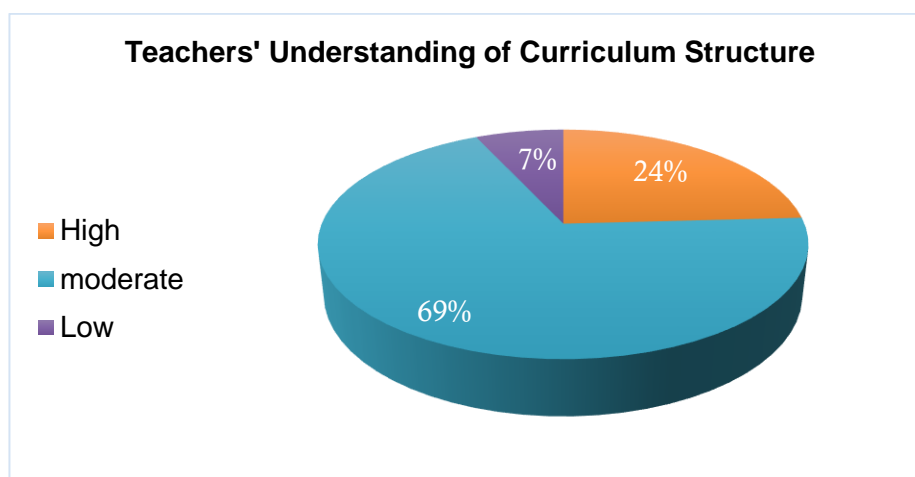


Figure 1. Diagram of the Teacher's Understanding of Curriculum Structure

Based on the survey results presented in Figure 1, it can be concluded that most teachers' understanding of the characteristics and structure of the MC is at a moderate level understanding. This result is relevant to the previous studies which showed that teachers' understanding of the structure of the independent curriculum was still low (Wahira et al., 2023). The teacher's perception refers to how the teacher perceives and understands the MC structure and its implementation in IPAS learning. Based on interview results, most teachers positively perceived the MC. Teachers are open to change and want to adapt to the MC implementation. MC gives them more flexibility and encourages them to learn and develop their capacity. Positive perceptions and a deep understanding of the MC influence teachers' approaches, strategies, and teaching in class. Teachers have understood the concepts and objectives of the MC, including the importance of developing higher order thinking skills and relevant learning experiences.

Lesson Plan Making

The ability in lesson plan making includes the ability to understand learning outcomes (CP), the ability to arrange TP from CP, the ability to make ATP based on the

TP that has been prepared, the ability to organize learning, the ability to develop teaching modules/lesson plan, ability to understand P5, and ability to prepare assessments. The curriculum is one of the crucial elements as a guide for learning planning. The autonomy of the curriculum enables teachers to be creative in creating original lesson plans that will enhance student learning (Ardianti & Amalia, 2022). Teachers can determine what will be taught according to the character and students' needs. That way, the learning design is not rigid but can accommodate each learning objective to be achieved. Learning planning includes formulating learning objectives, developing them, deciding on the content and how it will be presented, and the strategies to attain the objectives (Sadli & Saadati, 2023). The only way to succeed in IPAS learning is well-prepared planning.

Based on the interview results, the teachers revealed that the planning in IPAS learning is not much different from other subjects. The things done in planning activities include preparing lesson plans, learning materials, learning media, students' worksheets, and assessment instruments. In preparing teacher learning plans, they still experience several obstacles, primarily in formulating learning objectives and the learning objectives flow (ATP). Preparation of lesson plans is not mandatory as long as the teacher has developed teaching modules. However, in practice, most teachers still rely on teaching modules provided by the government. This finding aligns with several previous studies, which revealed that teachers still experience many obstacles in planning lessons in implementing a MC (Syaripudin et al., 2023). One of the government's efforts to support the MC implementation is to provide the Merdeka Belajar platform that provides various topics on the MC to various reference tools and learning resources. Learning planning plays an important role in successfully implementing the curriculum, especially in determining the steps for implementing and evaluating learning. The teacher's ability level regarding lesson plan-making is presented in Figure 2 below.

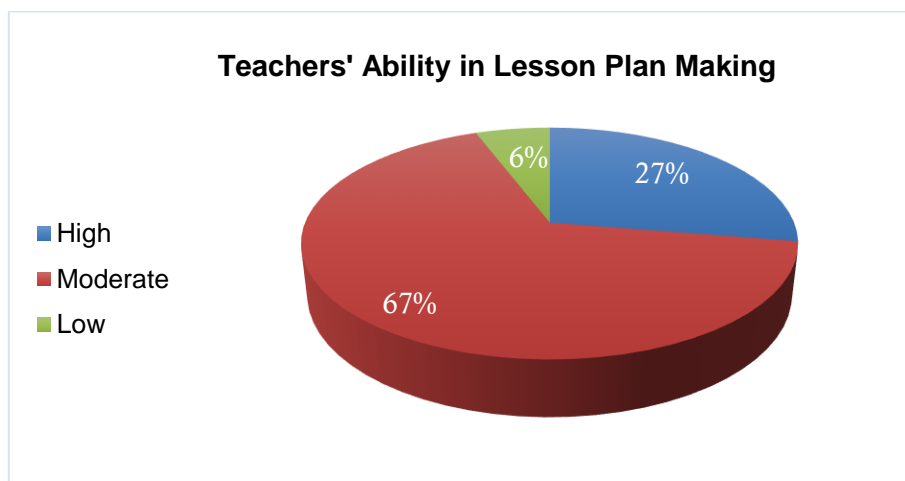


Figure 2. The Teacher's Ability in Lesson Plan Making

The level of teacher readiness in the learning planning aspect based on research results shows most in moderate ability. The research conducted by Hidayati & Nurdi (2022) also revealed that teachers still experience difficulties in compiling ATP and teaching modules. In lesson plan making, 85.1% of teachers have been able to develop Learning Objectives (TP) and Learning Objectives Flow (ATP) based on learning outcomes (CP). However, the teacher has not yet written down specific IPAS learning objectives and assessments related to scientific literacy skills, critical thinking skills, and computational thinking. Relating to attempting TP, the methods, models, media, and learning resources varied, and some teachers already use innovative approaches.

However, many teachers have not specifically integrated social and environmental issues into the learning process. Teachers must still learn basic concepts, scientific methods, and relevant issues related to designing learning activities. Teachers must be capable of planning and structuring lessons effectively. They must be able to identify the learning outcomes to be achieved, design appropriate learning activities, and determine relevant assessments. Teachers can utilize relevant resources to support IPAS learning, such as textbooks, interactive teaching materials, digital materials, and other innovative resources. Regarding the obstacles in preparing lesson plans, some teachers still experience difficulties developing diagnostic assessments to identify student competencies, weaknesses, and potential as a basis for lesson plans. A teacher is categorized as professional if he has good and effective planning and learning activities (Pertiwi et al., 2023). Learning activities at school will not run effectively if there is no good planning.

Learning Process

Learning activities in implementing the MC include differentiated intra-curricular learning and P5. Differentiated learning makes the learning atmosphere fun, and students can freely express their potential according to their interests. Teachers must understand that there is not only one right way, method, and strategy in learning. Quality learning is created by professional teachers (Tuasikal et al., 2021). The higher the teacher's competency, the higher the learning quality (Sulaiman & Ismail, 2020). Regarding the differentiated learning implementation, the proportion of the teachers' understanding level of differentiated learning can be seen in Figure 3 below.

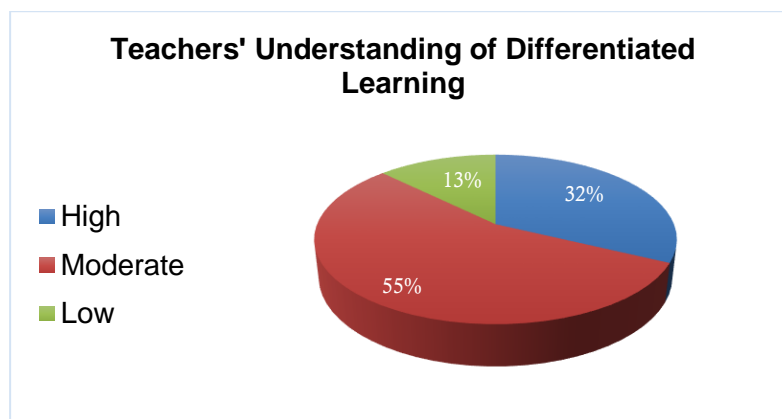


Figure 3. Teachers' Understanding of Differentiated Learning

Based on Figure 3 can be concluded that the teachers' understanding level of differentiated learning was categorized in medium level. Differentiated learning is the principle through which Paradigm enables students to learn by their individual learning requirements and the stage of their contextual development (Lindner & Schwab, 2020). Customized learning through differential teaching methods is designed to meet the specific learning requirements of students. It aims to enhance their creativity and promote innovative thinking. Intra-curricular learning in the classroom already reflects some of the essential characteristics of the MC. The IPAS learning has been integrated with natural and social studies. The Merdeka Curriculum follows the principles of New Paradigm learning, which includes five key principles. These principles aim to ensure that students' learning is tailored to their developmental stage and level of achievement and that they build the capacity to become lifelong learners. The learning process also focuses on developing students' competence and character holistically. Additionally, relevant learning is designed to align with the context, environment, and culture of

students, and involves parents and the community as partners. The Merdeka Curriculum emphasizes sustainable and future-oriented learning.

Regarding teachers' knowledge of implementing the Pancasila Student Profile Strengthening Project (P5), 87.4% of teachers admitted that they had implemented P5 activities related to the content of IPAS. Implementation of P5 is allocated on a particular day outside of class. The teacher's level of understanding regarding P5 is presented in Figure 4.

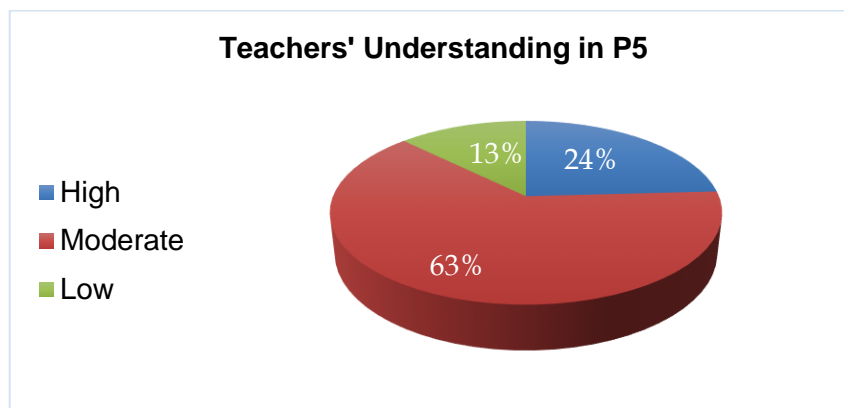


Figure 4. Teacher's level of understanding regarding P5

At the end of the lesson, the teacher reflected on learning and provided learning feedback. As many as 82.8% of teachers said they understood the concept of reflective teaching, and 93.1% of teachers already understood the Project Based Learning (PjBL) model related to the P5 implementation. The P5 theme that has been carried out includes a sustainable lifestyle, local wisdom, unity in diversity, building body and soul, engineering and technology, and market day.

The teacher's response to the IPAS learning implementation in the MC is positive. Implementing the MC allows teachers and students to be more creative in creating learning based on the students' character. It's just that teachers still need time to adapt to existing changes. The obstacles currently faced are teachers' lack of experience regarding Merdeka Belajar platforms, the limitations of getting references for implementing the MC, and the lack of experience. These teachers also said that implementing the MC allowed students to choose their desired learning activities. Learning uses teaching modules from the government, which are modified according to student needs. Teachers still don't understand and still need training to prepare teaching modules.

Learning Materials, Facilities, and Infrastructure

Learning materials are an essential component of the learning process (Prabaningrum & Sayekti, 2023). In general, learning materials can be divided into printed and non-printed. Printed learning materials include handouts, books, modules, brochures, and student worksheets. While non-printed includes audio, video, recording, e-book, and e-module. The development of learning modules is increasingly encouraged in MC implementation. Teachers who have developed teaching modules do not make lesson plans. The percentage of teachers developing their own IPAS module is presented in Figure 5.

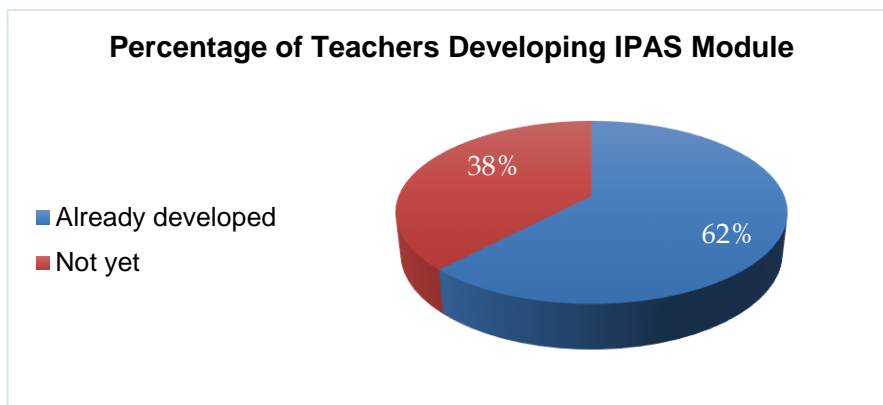


Figure 5. Percentage of Teachers Developing IPAS Module

Regarding the development of teaching modules, 38% of teachers admitted that they had not developed their own learning modules. Several teachers who had not yet developed their own modules revealed that they still used modules available on the internet or visited schools already in the Merdeka Berbagi category. In the learning process, several teachers are still fully guided by the government IPAS textbook, which still has some misconceptions (Budiwati et al., 2023). The core knowledge content and metacognition framework are also not optimal (Agustina et al., 2022). Teachers need supplementary books and not make the IPAS textbook the only book used. Several teachers who have developed IPAS modules modified some modules from the internet according to their class needs. Based on interviews, which reveal that IPAS textbooks are still limited and lacking in detail. The development of IPAS learning modules capable of developing scientific literacy skills is urgently needed.

In several schools, the facilities owned by the school became an obstacle to implementing the MC. Several teachers complain that the supporting facilities for implementing the MC are incomplete.

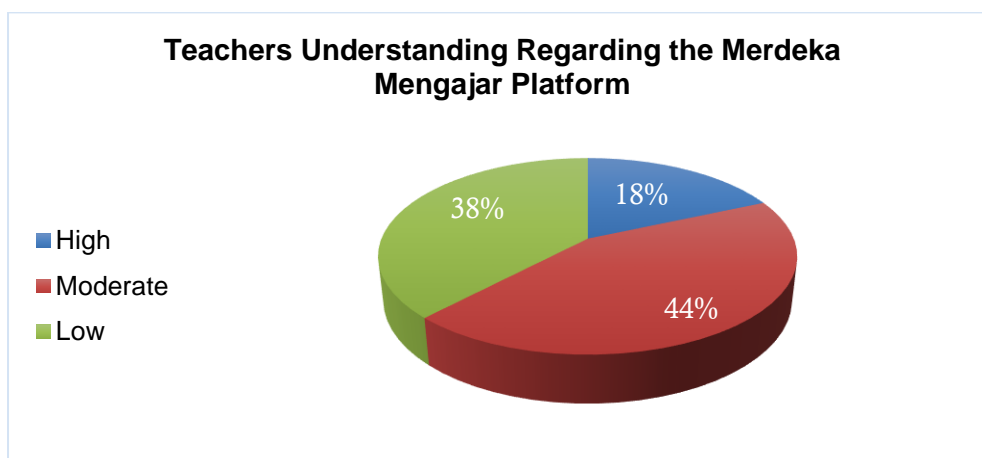


Figure 6. Teachers Understanding Regarding the Merdeka Mengajar Platform

Until 70.1% of teachers stated that the socialization and training facilities for implementing the independent curriculum in elementary schools were sufficient. The enthusiasm of educators and school principals is very good for advancing education. This is in line with research results (Hidayati & Nurdi, 2022) that many teachers still experience difficulties in utilizing the Merdeka Mengajar Platform, Rumah Belajar, as well as using technology to create learning products or content.

Learning Assessment

Learning assessment is an instrument used to see whether the learning process has been effective and shows student achievement results. The assessment aims to evaluate and monitor processes, learning progress, and continuous improvement of student learning and is used by the government to make policies in education (Shadri et al., 2023). In terms of curriculum implementation, assessment is a critical component of the curriculum tool used to measure and assess the level of competence attained. Assessment in the implementation of the MC is a cycle that is carried out through a diagnostic assessment to determine the potential, needs, characteristics, and development stages of student achievement which is carried out at the beginning of the school year as a basis for lesson planning and student grouping. During the learning process, the teacher will periodically conduct formative assessments to determine student learning progress as material for adjusting learning methods. At the end of the learning process, the teacher carries out a summative assessment to measure the achievement of learning objectives.

Diagnostic assessment is a prerequisite for differentiated learning because the teacher will use the diagnostic assessment results or this initial assessment as a basis for learning interventions (Laulita et al., 2022). In implementing differentiated learning, teachers have used various instruments. The tools the teacher used to determine students' character, learning styles, talents, interests, and intelligence in implementing differentiated learning are detailed in Table 2.

Table 2. Teachers' diagnostic instruments

Instruments	Total	Percentage
haven't used	8	9.20%
paper-based manual survey	55	63.22%
paper-based manual psychological test	15	17.24%
Psychological test based on digital platform	9	10.34%

Learning assessment is also an instrument used to see whether the learning process has been effective and shows student achievement results. The teacher's understanding of assessment in the MC is presented in Figure 7.

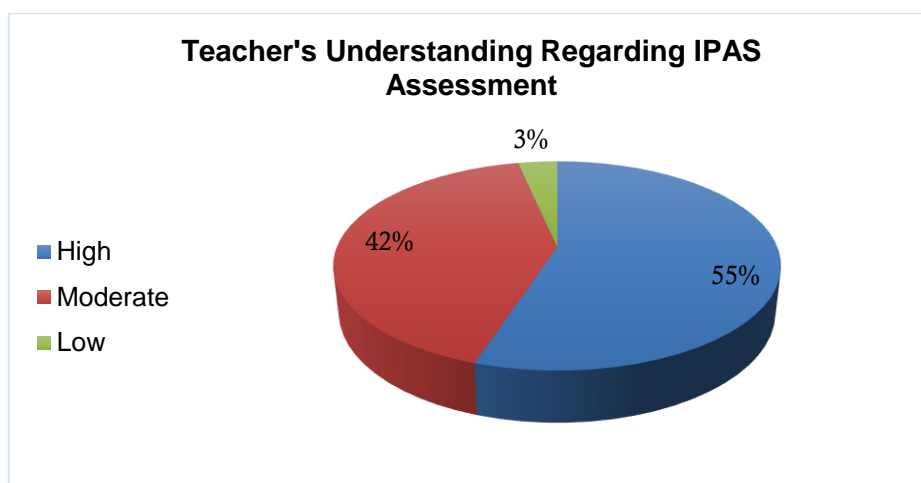


Figure 7. Teacher's Understanding Regarding IPAS Assessment

Teachers still do not understand about making assessment tools and do not understand the aspects of reporting the assessment. These teachers need training related to assessment in the MC. One of the assessments that can be used in learning in elementary school is authentic assessment, which can provide detailed information about student learning outcomes. However, many instruments are needed.

The teacher's response regarding the MC implementation has been implemented since the 2022-2023 academic year, and its implementation is still in stages. Psychologically, when interviewed regarding teachers' readiness to implement the independent curriculum, 96.6% said they were ready. They feel that they must be ready for all the dynamics of curriculum changes. The teachers' response positively regarding implementing the MC was good as an effort to transform in a better education. Through implementing the MC, teachers can better explore the potential of each student to provide relevant learning. Teachers feel very enthusiastic about the MC implementation.

Conceptually, the teacher's understanding of the independent curriculum was good; it's just that the implementation was still not structured. Teachers were still in the process of adaptation. Teachers must adapt to better understand learning devices, learning processes, and assessments. Curriculum changes require outreach to teachers who are implementers in the field. The new curriculum must be able to make all teachers understand the new curriculum so that the implementation of the new curriculum is successful.

CONCLUSION

Based on the data analysis and previously presented results, this study concludes that teachers' readiness in the curriculum structure understanding is 24% in the high category, 69% medium, and 7% low. In the lesson plan-making aspect, 27% are in the high category, 67% medium, and 6% low category. In the aspect of understanding of differentiated learning, 32% are in the high category, 55% medium, and 13% low. In terms of understanding P5, 24% are in the high category, 63% medium, and 13% low. Regarding the understanding of the Merdeka Mengajar platform, 18% are in high category, 44% medium, and 38% low. Teachers' understanding regarding the IPAS assessment is 55% in the high category, 42% medium, and 3% low. Teachers have expressed positive feedback about the incorporation of IPAS learning into the Merdeka Curriculum, demonstrating their openness to embracing curriculum changes. To ensure successful integration, it's crucial to acknowledge the varying perceptions and levels of preparedness among teachers and provide personalized training and support while maintaining alignment with the curriculum. By addressing these critical factors and keeping communication channels open, educational authorities can increase the likelihood of successful IPAS integration, ultimately leading to improved education quality for students within the Merdeka Curriculum framework.

REFERENCES

- Adriyawati, Utomo, E., Rahmawati, Y., & Mardiah, A. (2020). Steam-project-based learning integration to improve elementary school students' scientific literacy on alternative energy learning. *Universal Journal of Educational Research*, 8(5), 1863–1873. <https://doi.org/10.13189/ujer.2020.080523>
- Agustina, N. S., Robandi, B., Rosmiati, I., & Maulana, Y. (2022). analisis pedagogical content knowledge terhadap buku guru ipas pada muatan ipa sekolah dasar kurikulum merdeka. *Jurnal Basicedu*, 6(5), 9180–9187. <https://doi.org/10.31004/basicedu.v6i5.3662>
- Ahied, M., Muharrami, L. K., Fikriyah, A., & Rosidi, I. (2020). Improving students' scientific literacy through distance learning with augmented reality-based

- multimedia amid the covid-19 pandemic. *Jurnal Pendidikan IPA Indonesia*, 9(4), 499–511. <https://doi.org/10.15294/jpii.v9i4.26123>
- Al Sultan, A., Henson, H. J., & Fadde, P. J. (2018). Pre-Service Elementary Teachers' Scientific Literacy and Self-Efficacy in Teaching Science. *IAFOR Journal of Education*, 6(1), 25–42.
- Ardianti, Y., & Amalia, N. (2022). Kurikulum Merdeka: Pemaknaan Merdeka dalam Perencanaan Pembelajaran di Sekolah Dasar. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 6(3), 399–407. <https://doi.org/10.23887/jppp.v6i3.55749>
- Asnawi, A. R., Setyowati, K., Alnisyar, A. A. R. N., Azhari, M. H. R., Mustiningsih, M., & Timan, A. (2022). Analisis Pembaharuan Kurikulum Darurat pada Mata Pelajaran Pendidikan Pancasila dan Kewarganegaraan. *Edukatif: Jurnal Ilmu Pendidikan*, 4(1), 786–794. <https://doi.org/10.31004/edukatif.v4i1.1824>
- Azwar. (2012). *Metode Penelitian*. Yogyakarta: Pustaka Pelajar.
- Budiwati, R., Budiarti, A., Muckromin, A., Hidayati, Y. M., & Desstya, A. (2023). Analisis Buku IPAS Kelas IV Kurikulum Merdeka Ditinjau dari Miskonsepsi. *Jurnal Basicedu*, 7(1), 523–534. <https://doi.org/10.31004/basicedu.v7i1.4566>
- Chen, J., Zhang, Y., Wei, Y., & Hu, J. (2021). Discrimination of the Contextual Features of Top Performers in Scientific Literacy Using a Machine Learning Approach. *Research in Science Education*, 51, 129–158. <https://doi.org/10.1007/s11165-019-9835-y>
- Digna, D., Minsih, & Widyasari., C. (2023). Teachers' Perceptions of Differentiated Learning in Merdeka Curriculum in Elementary Schools. *International Journal of Elementary Education*, 7(2), . ejournal.undiksha.ac.id/index.php/IJEE/article/view/54770
- Fahmi, M. R., Muchtarom, M., & Winarno, W. (2023). Analyzing Civics Education Teachers' Difficulties in Applying Merdeka Curriculum at SMPN 9 Kota Bima. *Indonesian Journal of Multidisciplinary Science*, 2(9), 3184–3194. <https://doi.org/10.55324/ijoms.v2i9.541>
- Faisal, & Martin, S. N. (2019). Science education in Indonesia: Past, present, and future. *Asia-Pacific Science Education*, 5(1), 1–29. <https://doi.org/10.1186/s41029-019-0032-0>
- Hadi, S., & Novaliyosi. (2019). Trends in International Mathematics and Science Study (TIMSS). *The Language of Science Education*, 108–108. https://doi.org/10.1007/978-94-6209-497-0_97
- Hidayati, Z., & Nurdi. (2022). Persepsi Guru terhadap Implementasi Kurikulum Merdeka dalam Pembelajaran PAI dan Budi Pekerti di Sekolah Dasar. *Jurnal Cendekia: Media Komunikasi Penelitian Dan Pengembangan Pendidikan Islam*, 14(01), 96–105.
- IEA. (2015). *Highlights from TIMSS 2015*. <https://timssandpirls.bc.edu/timss2015/>
- Jufrida, J., Basuki, F. R., Kurniawan, W., Pangestu, M. D., & Fitaloka, O. (2019). Scientific literacy and science learning achievement at junior high school. *International Journal of Evaluation and Research in Education*, 8(4), 630–636. <https://doi.org/10.11591/ijere.v8i4.20312>
- Kemdikbud. (2022). *Buku Saku Kurikulum Merdeka*. Kementerian Pendidikan dan Kebudayaan.
- Kemendikbudristek. (2022). *Buku Saku: Tanya Jawab Kurikulum Merdeka*. *Kemendikbudristek*, 9–46. ult.kemdikbud.go.id
- Kirom, A. (2017). Peran Guru dan Peserta Didik dalam Proses Pembelajaran Berbasis Multikultural. *Al-Murabbi: Jurnal Pendidikan Agama Islam*, 3(1), 69–80. <https://doi.org/10.33578/pjr.v5i4.8361>
- Laulita, U., Marzoan, & Rahayu, F. (2022). Analisis kesiapan guru dalam

- mengimplementasikan asesmen diagnostik pada kurikulum merdeka. *Jurnal Pendidik Indonesia*, 5(2), 2022.
- Lestari, Darmansyah, & Desyandri. (2022). Analisis Implementasi Kurikulum Merdeka di Sekolah Penggerak SDN 12 Padanglua. *Jurnal Basicedu*, 12(2), 131–138. <https://doi.org/10.31004/basicedu.v6i5.3216>
- Lestari, N. A. P. (2023). Analysis of 2013 curriculum problems so it is changed into a merdeka curriculum. *Jurnal Pendidikan Dasar Nusantara*, 8(2), 263–274. <https://doi.org/10.29407/jpdn.v8i2.19229>
- Lindner, K. T., & Schwab, S. (2020). Differentiation and individualisation in inclusive education: a systematic review and narrative synthesis. *International Journal of Inclusive Education*, 0(0), 1–21. <https://doi.org/10.1080/13603116.2020.1813450>
- Mabsutsah, N., Hariyadi, S., & Prihatin, J. (2023). The Readiness of Science Teachers to Implement Differentiated Learning and Integrated STEM in Ecology Subject of the “Merdeka” Curriculum in Junior High School. *Bioedukasi*, 21(2), 99–110. <https://doi.org/10.19184/bioedu.v21i2.39567>
- Miles, M. B., & Huberman, A. . (2014). *Qualitative Data Analysis, A Methods Sourcebook, Edition 3*. USA: Sage Publications. Terjemahan Tjetjep Rohindi Rohidi, UI-Press.
- Moleong, L. J. (2017). *Metode Penelitian Kualitatif*. Bandung: PT. Remaja Rosdakarya.
- Muyassaroh, I., & Herianingtyas, N. L. R. (2023). Enhancing Elementary Preservice Teachers’ Scientific Literacy by Using Flipped Problem-Based Learning Integrated with E-campus. *Jurnal Pendidikan : Teori, Penelitian, Dan Pengembangan*, 8(2), 1–12.
- Muyassaroh, I., & Mukhlis, S. (2023). Model Inkuiri Terbimbing Berbantuan Buku Dongeng Movable Berbasis Etnosains untuk Meningkatkan Literasi Sains Siswa. *Ar-Riyah : Jurnal Pendidikan Dasar*, 7(2), 1–19. <https://doi.org/10.29240/jpd.v7i2.6832>
- Nahdiyah, U., Arifin, I., & Juharyanto, J. (2022). Pendidikan profil pelajar pancasila ditinjau dari konsep kurikulum merdeka. *Seminar Nasional Manajemen Strategi Pengembangan Profil Pelajar Pancasila Pada Pendidikan Anak Usia Dini (PAUD) Dan Pendidikan Dasar (Dikd As)*, 5, 1–8.
- Noor, F. M. (2020). Memperkenalkan Literasi Sains Kepada Peserta Didik: Perspektif Calon Guru PIAUD. *ThufuLA: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal*, 8(1), 56–67. <https://doi.org/10.21043/thufula.v8i1.7066>
- Nurani, D., Anggraini, L., Misiyanto, & Mulia, K. rizqi. (2022). *Buku saku serba-serbi kurikulum merdeka kekhasan sekolah dasar*. Jakarta: Tim Pusat Kurikulum dan Pembelajaran.
- Nurhanifah, A., & Diah Utami, R. (2023). Analisis Peran Guru dalam Pembudayaan Literasi Sains pada Siswa Kelas 4 Sekolah Dasar. *Jurnal Elementaria Edukasia*, 6(2), 463–479. <https://doi.org/10.31949/jee.v6i2.5287>
- OECD. (2019). *PISA 2018 Results*. In *OECD Publishing*. <https://doi.org/10.1787/g222d18af-en>
- Pertiwi, P. D., Novaliyosi, N., Nindiasari, H., & Sukirwan, S. (2023). Analisis Kesiapan Guru Matematika dalam Implementasi Kurikulum Merdeka. *JlIP - Jurnal Ilmiah Ilmu Pendidikan*, 6(3), 1717–1726. <https://doi.org/10.54371/jiip.v6i3.1435>
- Prabaningrum, W. F., & Sayekti, I. C. (2023). Implementasi Kurikulum Merdeka di Sekolah Dasar Tahun Ajaran 2022/2023. *Jurnal Elementaria Edukasia*, 6(2), 374–383. <https://doi.org/10.31949/jee.v6i2.5326>
- Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). Pembelajaran IPA Abad 21 dengan Literasi Sains Siswa. *Jurnal Materi Dan Pembelajaran Fisika*, 9(1), 34–42.
- Purani, N. K. C., & Putra, I. K. D. A. S. (2022). Analisis Kesiapan Guru dalam Penerapan Kurikulum Merdeka Belajar di SDN 2 Cempaga. *Jurnal Pendidikan Dasar Rare Pustaka*, 4(2), 8–12.

- Queiruga-Dios, M. Á., López-Iñesta, E., Diez-Ojeda, M., Sáiz-Manzanares, M. C., & Dorrío, J. B. V. (2020). Citizen science for scientific literacy and the attainment of sustainable development goals in formal education. *Sustainability (Switzerland)*, 12(10), 1–18. <https://doi.org/10.3390/su12104283>
- Rachmatullah, A., Roshayanti, F., Shin, S., Lee, J. K., & Ha, M. (2018). The secondary-student science learning motivation in Korea and Indonesia. *Eurasia Journal of Mathematics, Science and Technology Education*, 14(7), 3123–3141. <https://doi.org/10.29333/ejmste/91665>
- Ramadhan, D. Y., & Meilana, S. F. (2022). Analisis Kesiapan Guru Dalam Mengajar Materi IPA Pada Pembelajaran Tatap Muka Dimasa Pandemi COVID-19. *Didaktis: Jurnal Pendidikan Dan Ilmu Pengetahuan*, 22(2), 208–219.
- Ratini, Muchtar, H., Suparman, M. A., Tamuri, A. H., & Susanto, E. (2018). The influence of learning models and learning reliance on students' scientific literacy. *Jurnal Pendidikan IPA Indonesia*, 7(4), 458–466. <https://doi.org/10.15294/jpii.v7i4.12489>
- Rois, I. N., Setiawan, Zahida, N. K., & Mohtaz, R. (2023). Analyzing the implementation of the merdeka curriculum for Arabic language learning in post-pandemic era. *Alsinatuna: Jurnal of Arabic Linguistic and Education*, 8(2), 189–200.
- Rubini, B., Ardianto, D., Pursitasari, I. D., & Permana, I. (2016). Identify scientific literacy from the science teachers' perspective. *Jurnal Pendidikan IPA Indonesia*, 5(2), 299–303. <https://doi.org/10.15294/jpii.v5i2.7689>
- Rusilowati, A., Kurniawati, L., Nugroho, S. E., & Widiyatmoko, A. (2016). Developing an instrument of scientific literacy asesment on the cycle theme. *International Journal of Environmental and Science Education*, 11(12), 5718–5727.
- Sadli, M., & Saadati, B. A. (2023). Analisis Kesiapan Guru Dalam Menerapkan Kurikulum Merdeka Belajar (Studi Kasus di Sekolah Dasar Negeri 2 Batujai). *Jurnal Ilmiah Mandala Education (JIME)*, 9(2), 1333–1338. <https://doi.org/10.58258/jime.v9i1.5087/http>
- Shadri, R., Hermita, N., Deswarni, D., S, A. P., Lingga, L. J., & Wijoyo, H. (2023). Assessment in the Merdeka Curriculum: How Are the Teachers' Perspectives on It? *JURNAL PAJAR (Pendidikan Dan Pengajaran)*, 7(1), 202. <https://doi.org/10.33578/pjr.v7i1.9127>
- Siagian, P., Silitonga, M., & Djulia, E. (2017). Scientific Literacy Skills of Seventh Grade Junior High School (SMP Negeri) Students in North Labuhanbatu Regency. *International Journal of Humanities Social Sciences and Education (IJHSSE)*, 4(11), 176–182.
- Sulaiman, J., & Ismail, S. N. (2020). Teacher competence and 21st century skills in transformation schools 2025 (TS25). *Universal Journal of Educational Research*, 8(8), 3536–3544. <https://doi.org/10.13189/ujer.2020.080829>
- Syaripudin, S., Witarsa, R., & Masrul, M. (2023). Analisis Implementasi Kurikulum Merdeka pada Guru-guru Sekolah Dasar Negeri 6 Selatpanjang Selatan. *Journal of Education Research*, 4(1), 178–184. <https://jer.or.id/index.php/jer/article/view/142%0Ahttps://jer.or.id/index.php/article/download/142/115>
- Tiro, A. R., Nidiasari, Y., & Massa, N. (2020). Analisis Pemahaman Konsep Literasi Sains Pada Mahasiswa Pendidikan IPA FKIP UNIMUDA Sorong. *BASA (Barometer Sains)* ..., 1(1), 1–12. <https://unimuda.e-journal.id/basa/article/view/369%0Ahttps://unimuda.e-journal.id/basa/article/download/369/311>
- Tricahyati1, S., & Zaim, M. (2023). Teachers' Readiness in Implementation of "Merdeka Belajar" Curriculum in Teaching English at Junior High School in Padang. *Jelt*, 12(1), 97–105. <https://doi.org/10.24036/jelt.v12i1.121783>
- Tuasikal, A. R. S., Hartoto, S., Prakoso, B. B., Kartiko, D. C., & Hariyanto, A. (2021). the

- Analysis on Teaching Skills and Learning Effectiveness of Internship Students. *Cakrawala Pendidikan*, 40(3), 650–658. <https://doi.org/10.21831/cp.v40i3.40466>
- Vieira, R. M., & Tenreiro-Vieira, C. (2016). Fostering Scientific Literacy and Critical Thinking in Elementary Science Education. *International Journal of Science and Mathematics Education*, 14(4), 659–680. <https://doi.org/10.1007/s10763-014-9605-2>
- Wahira, W., Hamid, A., & HB, L. (2023). Pelatihan Pemahaman Kurikulum Merdeka Belajar Pada Guru Sekolah Dasar. *EJOIN: Jurnal Pengabdian Masyarakat*, 1(2), 43–47. <https://doi.org/10.55681/ejoin.v1i2.572>
- Wijayanti, I., & Intan Nur Ngazizah. (2023). Kesiapan Madrasah Mengimplementasikan Kurikulum Merdeka di MIN 2 Bantul. *Jurnal Elementaria Edukasia*, 6(2), 384–397. <https://doi.org/10.31949/jee.v6i2.5403>