Implementing Kurikulum Merdeka: Strengthening Scientific Literacy

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Abstract. The learning process has evolved from face-to-face to online, hybrid, and back to face-to-face. This change resulted in a number of changes, particularly in the learning curriculum, which began as the Kurikulum 2013, evolved into the Kurikulum Darurat, and is now being implemented as the Kurikulum Merdeka. The purpose of this research is to reinforce the importance of scientific literacy in the implementation of the Kurikulum Merdeka. The results of published research on the relationship of scientific literacy to Kurikulum Merdeka achievements are the subject of this study. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method was used in this study. According to the findings, there is a relation between scientific literacy and the Kurikulum Merdeka. According to the findings of this study, students in the Kurikulum Merdeka for Elementary Schools are expected to cultivate environmental awareness and life skills. Meanwhile, scientific literacy necessitates an explanation of facts for all scientific phenomena. Thus, through scientific literacy, students are able to protect nature through scientific phenomena.

Keywords: Kurikulum Merdeka, Scientiific, Literacy, PRISMA, Elementary School

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INTRODUCTION

Education is a very important aspect of life because of the significant role and positive impact that the advancement of an education system has. Indonesia's education system and quality remain among the worst in the world. (Farhan Zabdul Aziz, Farid Setiawan, David Hariadi, 2022). This supported to the results of the 2018 PISA of Indoneisa are decreaseing compared to 2015 with a score of 396 (OECD average was 489) (OECD, 2019b). the PISA requires students to able to plan and do based on their plan as well as solve problems with their peers in group. This fact can be indicator that Indonesia students still lack scientific literacy skills and it becomes a bg challenge for the government, teacher, and researches to work harder to improve the students; performance in the following PISA tests (Supahar & Widodo, 2021).

Based on this understanding, a curriculum change that improves students' scientific literacy skills is required. Changes or improvements to the curriculum are the government's way of adapting education to the demands of the twenty-first century, in which science and technology are developing at a breakneck pace that cannot be controlled (Angga et al., 2022). As a result, there is no other option but to improve educational references, specifically the curriculum.. The mode science create, the more this educational curriculum changes (Pratikno et al., 2022).

The COVID-19 pandemic has altered the learning process in schools, as learning is now done online at home, with various policies in place. The education unit developed the Kurikulum Darurat as a result of this. The Kurikulum Darurat is a curriculum designed by simplifying the National Curriculum and is expected to meet educational needs in the event of a COVID-19 pandemic.(Nugraha, 2022). In the context of learning recovery following the declaration of covid 19 as endemic, the research unit offers options for implementing a curriculum that meets students' learning needs. Kurikulum 2013, Kurikulum Darurat,and Kurikulum Merdeka are the three curriculum options. The discussion in this article is about the independent curriculum.

Freedom to learn is a new curriculum developed by the Ministry of Education and Culture of the Republic of Indonesia called "Kemendikbud RI" that includes independent learning so that educators, students, and parents can enjoy a pleasant learning environment. (Arviansyah & Shagena, 2022). Learning freedom necessitates that educational development create a pleasant environment. Independent learning, also known as "free learning," is a type of government strategy development that restores assessment's increasingly neglected nature. The concept of

independent learning is a type of policy adjustment that restores the national education system to its legal nature, allowing schools to be autonomous in interpreting the core competencies of the curriculum in the assessment process. (Nasution, 2021).

Kurikulum Merdeka is presented in an attempt to improve learning losses caused by the Covid 19 pandemic. Kurikulum Merdeka is expected to be a new approach to achieving great competencies in the 21st century, specifically the ability to think, act, and live in the world. Critical thinking, creative thinking, and problem solving are examples of thinking competencies. Communication, collaboration, digital literacy, and technological literacy are examples of action competencies. While living in the world requires initiative, self-direction, global understanding, and social responsibility, (Putriani & Hudaidah, 2021). Critical thinking has a significant relaton with scientific literacy. Scientific literacy is strongly associated with a person's ability to read and writes, as well as the use of language fluently, effectively and critically (Rubini et al., 2016).

METHOD

The method of this research is Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). PRISMA is a method for including or excluding article (Haq et al., 2022). Prisma provides a structured and systematic flow, making it easier to conduct a literature review. Thus it can be used to investigate a study (Lee et al., 2018). The article used as material in this literature limited by four criteria, namely :

1. Peer-reviewed articles
2. Article manuscripts published by journal and proceeding
3. Available full-text article manuscript
4. Article using English and Indonesian

These criteria ara applied throughout the stages of RISMA. To obtain articles that meet criteria (1) and (2), namely peer reviewed articles, the Dimension database, Science Direct, and Google scholar were used in this study. Furthermore, to fulfill criteria (3) and (4), the keywords used in this article search were "Kurikulum Merdeka" and "Scientific Literacy". to make things easier, the journal criteria used can be seen in table 1.

Criteria	Description
Inclusion	English
	Indonesian
	According to Keyword
Exclusion	Scientific Literacy
	Kurikulum Merdeka
	Elementary School

The literature obtained as many as 5167 journal articles that match the set criteria from the search results. The appropriate criteria are then selected for a systematic review..

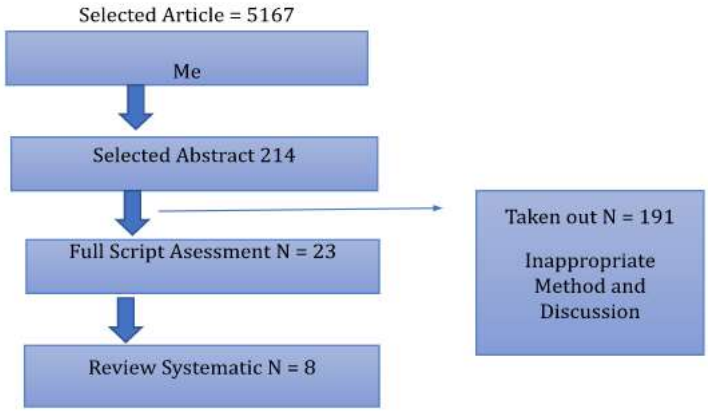

Figure 1.Roadmap Literature Research

RESULTS

Based on the research search results, 8 journals with research methods, such as qualitative and quantitative research, with the research design mostly using descriptive and comparative designs, were obtained. The findings of articles that meet the research criteria are mostly descriptive and comparative in nature. The findings of articles that meet the research criteria are presented in the table below, with the title, author, year of publication, research location, research objectives, research methods, research samples, and research results included.

Table. 1 Results of Systematic Review

No	Title, (Author, Years)	Location	Research Goal	Research Design	Numbers of Sample	Finding
1	**English Learners' Science-Literacy Practice Through Explicit Writing Instruction in Invention Based Learning** (Kim & Kim, 2021)	United State	Explore how three English learners, also referred as L2 learners, improve in science literacy in an invention based learning (IBL) projects, IBL, a project based learning invenstion, asks students to respond to problems by inventing	Quantitative	3 English Learners	Stundents language skills and conceptual learning developed. In addcition, students perceived writing as an essential sill for learning science.

No	Title, (Author, Years)	Location	Research Goal	Research Design	Numbers of Sample	Finding
2	**Gadget Based Interactive Multimedia on Socio-Scientific Issue to Improve Elementary Students' Scientific Literacy** (Suryanti et al., 2021)	Indonesia	Develop Socio-scientific Issues (SSI) gadget based interactive multimedia (GMBIM) to improve elementary students's scientific literacy	Quantitiave	25 suburban students	GBIM is compatible as alternative learning media to improve elementary students'scientific literacy
3	**The Relationship Between Learning Styles with Learning Outcome and Scientific Literacy of Islamic Junior High School (MTs) Students in Mataram** (Nufus et al., 2021)	Indonesia	Aims to investigate the relationship between learning styles with student learning outcomes and scientific literacy	Descriptive survery research	55 MTs students in Mataram	The trens of auditory and kinesthetic learning styles correlated significantly with students' scientific literacy, whereas visual and reading/writing learning styles did not significantly correlate. the types of learning styles does not have a different effect on students learning outcomes and scientific literacy, but scientific literacy has a significant influence on learning outcomes.
4	**Development of INoSIT (Integration Nature of Science in Inquiry with Technology)**	Indonesia	Integrate information and communication Technology (ICT) with inquiry and nature of science (NoS) models to	Literature studies	Several research study in the form of journals or	• INoIT Model developed to train scientific literacy in junior high school • The activity can create hypotheses (hypothese

No	Title, (Author, Years)	Location	Research Goal	Research Design	Numbers of Sample	Finding
	Learning Models to Improve Science Literacy: A Preliminary Studies (Takda et al., 2022)		teach scientific literacy to junior high school students		books related to BSCS 5E model and the Inquiry Models	s formulation) which is a sontinuaton of the first phase which aims to engage students in inquiry learning • The main activities are conducting experiments, collecting, analyzing data both with KIT media and with the help of interactive help student research, organize, and implement ideas, gather, analyze, and evaluate data and draw conclusion
5	**Asessment Kurikulum Merdeka Belajar di Sekolah Dasar** (Nasution, 2021)	Indonesia	Collecting information about students' processes and learning outcomes in order to make decisions based on specific criteria and considerations	Descriptive Qualitative	Library data, reading and taking notes and processing rese	Kurikulum Merdeka wishes to foster a positive learning environment.

No	Title, (Author, Years)	Location	Research Goal	Research Design	Numbers of Sample	Finding
					arch materials	
6	**Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0** (Indarta et al., 2022)	Indonesia	Understanding the Importance of the Independent Learning Curriculum in the Development of the 21st Century Learning Model 5.0	Descriptive Qualitatitve	Journal and Book Library	urikulum Merdeka will transition students from learning in the classroom to learning outside of the classroom. The 21st Century learning model also emphasizes students developing their skills on their own. Teachers can use 21st century learning models in the application of the Independent Curriculum to develop 4C skills such as critical thinking, communication, collaboration, and creativity in order to adapt to any situation.
7	**Kurikulum Merdeka Untuk Pemulihan Krisis Pembelajaran** (Nugraha, 2022)	Indonesia	Understanding the importance of incorporating technology and the learning community into the implementation of Kurikulum Merdeka	*Historical Research* or *Documentary Study*	News, Government Document	The implementation of Kurikulum Merdeka is heavily reliant on information and communication technology. This is evident in the creation of a platform to aid in the implementation of the Independent Curriculum. Furthermore, by involving teachers, students, and academics, the learning community can be used to share best practices.

No	Title, (Author, Years)	Location	Research Goal	Research Design	Numbers of Sample	Finding
8	**Analisis Implementasi Kurikulum Merdeka di sekolah Penggerak Sekolah Dasar** (Ineu et al., 2022)	Indonesia	Understanding and researching the implementation of the Kurikulum Merdeka at Sekolah Penggerak SDN Guru Minda 224 D in Bandung	Observastion Phenomenolog, Interview and documents studies	2 teachers, 1 headmaster	Sekolah Penggerak can serve as a role model, a training facility, and an inspiration for teachers and other school principals.

DISCUSSION

According to the findings of the systematic review, there is an integration of the Kurikulum Merdeka and scientific literacy. Table 2 depicts the relationship between the two to facilitate understanding. Below:

Table 2. Integration Description of Scientific Literacy and Kurikulum Merdeka

Description Scientific Literacy and Kurikulum Merdeka	Journal Article
The role of technology, information, and communication in increasing scientific literacy and implementing the Kurikulum Merdeka is critical.	Gadget Based Interactive Multimedia on Socio-Scientific Issue to Improve Elementary Students' Scientific Literacy (Suryanti et al., 2021) Development of INoSIT (Integration Nature of Science in Inquiry with Technology) Learning Models to Improve Science Lite racy: A Preliminary Studies (Takda et al., 2022) Kurikulum Merdeka Untuk Pemulihan Krisis Pembelajaran (Nugraha, 2022)
Critical thinking is an indicator of scientific literacy and one of the Kurikulum Merdeka achievements.	English Learners' Science-Literacy Practice Through Explicit Writing Instruction in Invention Based Learning (Kim & Kim, 2021) Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0 (Indarta et al., 2022)

Description Scientific Literacy and Kurikulum Merdeka	Journal Article
Kurikulum Merdeka is being implemented in an effort to overcome learning loss; scientific literacy is another aspect that students must master in order to minimize learning loss after covid 19.	Kurikulum Merdeka Untuk Pemulihan Krisis Pembelajaran (Nugraha, 2022) Analisis Implementasi Kurikulum Merdeka di sekolah Penggerak Sekolah Dasar (Ineu et al., 2022)
Kinesthetic and auditory learning styles are enjoyable and effective ways to improve scientific literacy. It is required in the Kurikulum Merdeka to make learning enjoyable by involving parents, the community, and all academics.	The Relationship Between Learning Styles with Learning Outcome and Scientific Literacy of Islamic Junior High School (MTs) Students in Mataram (Nufus et al., 2021) Asessment Kurikulum Merdeka Belajar di Sekolah Dasar (Nasution, 2021)

According to the results of the systematic review's analysis in table 2, there is a very close integration between scientific literacy and Kurikulum Merdeka. Kurikulum Merdeka and Science Literacy are interconnected in technology and information, according to the first point. (Suryanti et al., 2021) conclude that the development of Socio-scientific Issues (SSi) *gadget based interactice Multimedia* (GMI) can increase student scientific literacy. then (Takda et al., 2022) concluded that Technology (ICT) with an inquiry approach and Natural Sciences is effective in teaching scientific literacy to junior high school students. In implementing Kurikulum Merdeka the importance of ICT is explained by (Nugraha, 2022) The Kurikulum Merdeka implementation is heavily reliant on information and communication technology. This is evident in the creation of a platform to aid in the implementation of Kurikulum Merrdeka. Furthermore, by involving teachers, students, and academics, the learning community can be used to share best practices.

the integration between scientific literacy and the Kurikulum Merdeka is the need for critical thinking skills. (Kim & Kim, 2021) concluded that scientific literacy influences students' writing skills through critical thinking. In support Kurikulum Merdeka,(Indarta et al., 2022) explained that the Kurikulum Merdeka was implemented in an effort to produce graduates who could master the 4Cs, namely critical thinking, communication, collaboration, and creativity, in order to adapt to any situation.

Third, by implementing the Kurikulum Merdeka, learning loss during the Covid 19 period can be remedied. Learning loss is a gap that occurs during the Covid 19 learning process in students' affective, psychomotor, and cognitive domains. The independent curriculum is expected to be able to improve learning loss recovery through the involvement of the learning community as a place to share good practice by involving teachers, students, and academics. (Nugraha, 2022). With the establishment of Sekolah Penggerak, it can serve as a role model, a training facility, and an inspiration to other teachers and principals. (Ineu et al., 2022).

Fourth, in implementing the Kurikulum Merdeka, various fun activities are needed (Nasution, 2021). With a kinesthetic learning style that prioritizes movement and action, fun activities can be used in the classroom. According to the findings of research conducted by (Nufus et al., 2021) state that the trens of auditory and kinesthetic learning styles correlated significantly with students' scientific literacy, whereas visual and reading/writing learning styles did not significantly correlate. the types of learning styles does not have a different effect on students learning outcomes and scientific literacy, but scientific literacy has a significant influence on learning outcomes.

CONCLUSION

Based on the results of the analysis using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method, the results obtained are that the application of the Kurikulum Merdeka has a close relationship with scientific literacy in terms of increasing the use of technology, developing critical thinking skills, decreasing learning loss and creating a pleasant learning atmosphere.

REFERENCES

Angga, A., Suryana, C., Nurwahidah, I., Hernawan, A. H., & Prihantini, P. (2022). Komparasi Implementasi Kurikulum 2013 dan Kurikulum Merdeka di Sekolah Dasar Kabupaten Garut. *Jurnal Basicedu*, *6*(4), 5877–5889. https://doi.org/10.31004/basicedu.v6i4.3149

Arviansyah, M. R. (2022). Efektivitas Dan Peran Dari Guru Dalam Kurikulum Merdeka Belajar. *Lentera*, *17*(1), 40–50.

Farhan Zabdul Aziz, Farid Setiawan, David Hariadi, F. N. S. (2022). Transformasi Kebijakan Kurikulum Pendidikan di Indonesia Sebagai Landasan Pengelolaan Pendidikan. *Attractive : Innovative Education Journal*, *4*(1), 1–12. https://attractivejournal.com/index.php/aj/article/view/438/302

Haq, A. F. W., Supian, S., & Chaerani, D. (2022). Systematic Literature Review on Troubleshooting Delivery of Production Product Using n-Vehicle with Vogel Total Difference Approach Method. *Jambura Journal of Mathematics*, *4*(2), 332–343. https://doi.org/10.34312/jjom.v4i2.14124

Indarta, Y., Jalinus, N., Waskito, W., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(2), 3011–3024. https://doi.org/10.31004/edukatif.v4i2.2589

Ineu, S., Teni, M., Yadi, H., Asep, H. H., & Prihantini. (2022). Analisis Implementasi Kurikulum Merdeka Belajar di Sekolah Penggerak. *Jurnal Basicedu*, *6*(5), 8248–8258. https://media.neliti.com/media/publications/444639-none-ee780f83.pdf

Kim, S. L., & Kim, D. (2021). English learners' science-literacy practice through explicit writing instruction in invention-based learning. *International Journal of Educational Research Open*, *2*(December 2020), 100029. https://doi.org/10.1016/j.ijedro.2020.100029

Lee, S., Lee, Y. Bin, Choe, S. J., & Lee, W. S. (2018). Adverse sexual effects of treatment with finasteride or dutasteride for male androgenetic alopecia: A systematic review and meta-analysis. *Acta Dermato-Venereologica*, *99*(1), 12–17. https://doi.org/10.2340/00015555-3035

Nasution, S. W. (2021). PROSIDING PENDIDIKAN DASAR URL: https://journal.mahesacenter.org/index.php/ppd/index Assesment Kurikulum Merdeka Belajar Di Sekolah Dasar. *Prosding Seminar Nasional Pendidikan Dasar*, *1*(1), 135–142. https://doi.org/10.34007/ppd.v1i1.181

Nufus, S. S., Hadiprayitno, G., & Jufri, A. W. (2021). The Relationship Between Learning Styles with Learning Outcome and Scientific Literacy of Islamic Junior High School (MTs) Students in Mataram. *Jurnal Ilmiah Mandala Education*, *7*(3), 28–34. https://doi.org/10.36312/jime.v7i3.2286

Nugraha, T. S. (2022). Kurikulum Merdeka untuk Pemulihan Krisis Pembelajaran. *Inovasi Kurikulum*, *2*, 160.

Pratikno, Y., Hermawan, E., & Arifin, A. L. (2022). Human Resource 'Kurikulum Merdeka' from Design to Implementation in the School: What Worked and What not in Indonesian Education. *Jurnal Iqra' : Kajian Ilmu Pendidikan*, *7*(1), 326–343. https://journal.iaimnumetrolampung.ac.id/index.php/ji/article/view/1708

Putriani, J. D., & Hudaidah, H. (2021). Penerapan Pendidikan Indonesia Di Era Revolusi Industri 4.0. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(3), 830–838. https://edukatif.org/index.php/edukatif/article/view/407

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

Supahar, & Widodo, E. (2021). The Effect of Virtual Laboratory Application of Problem-Based Learning Model to Improve Science Literacy and Problem-Solving Skills. *Proceedings of the 7th International Conference on Research, Implementation, and Education of Mathematics and Sciences (ICRIEMS 2020)*, *528*(Icriems 2020), 633–640. https://doi.org/10.2991/assehr.k.210305.092

Suryanti, S., Widodo, W., & Yermiandhoko, Y. (2021). Gadget-Based Interactive Multimedia on Socio-Scientific Issues to Improve Elementary Students' Scientific Literacy. *International Journal of Interactive Mobile Technologies*, *15*(1), 56–69. https://doi.org/10.3991/IJIM.V15I01.13675

Takda, A., Jadmiko, B., & Erman, E. (2022). Development of INoSIT (Integration Nature of Science in Inquiry with Technology) Learning Models to Improve Science Literacy: A Preliminary studies. *Jurnal Penelitian Pendidikan IPA*, *8*(1), 18–31. https://doi.org/10.29303/jppipa.v8i1.957