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Article

Exploring The Merdeka Curriculum: Insights Into Science Teaching Practices at Junior High School Level

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ABSTRACT

This study aims to comprehensively analyze the implementation of Merdeka Curriculum in lesson planning and implementation in Natural Science subjects. Data collection is carried out through observation, interviews, and documentation with instruments in the form of document review sheets, observation sheets, and interview sheets. The subjects of this study involved two science teachers and the deputy principal. The results of the document review of the teaching module showed the need for improvement in the selection of learning objectives and methods. Observations show that most of the implementation of science learning has met the learning process standards of the Merdeka Curriculum, with the achievement of 7 out of 10 aspects of the learning process (70%), 3 out of 4 aspects of meaningful learning (75%), and 3 out of 5 aspects of assessment (60%). However, improvements are needed in certain aspects of the learning process, meaningful learning, and assessment. This study provides recommendations to improve the quality of Merdeka Curriculum implementation in science learning, so that it can more effectively support national education goals.

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INTRODUCTION

The rapid development of technology and science makes the curriculum continue to evolve. The curriculum is very important in education. This is because the curriculum has an important role in creating a young generation that is intelligent, competent, has character, morals, and creates new ideas, and can be responsible (Andriani, 2020). The existence of a new curriculum and there are updates in a positive and efficient direction, of course, will create learning that can achieve the set national goals (Martin & Simanjorang, 2022). The existence of a new curriculum and there are updates in a positive and efficient direction, of course, will create learning that can achieve the set national goals (Martin & Simanjorang, 2022). Due of the wide range of definitions found in different educational literatures, it is challenging to describe curriculum in a straightforward and consistent manner. Different authors have different opinions; some define it broadly, while others restrict it to a particular setting. However, curriculum is described as a “plan for learning” in the context of education, according

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to curriculum developer Hilda Taba. This definition is sufficient without being overly restrictive (Jan, et.al., 2009).

In Indonesia, the curriculum serves as a tool to accomplish national education goals, hence it can be said that the curriculum serves as a guide for the entire educational process, from planning to evaluation to meet learning objectives (Insani, 2019). In Indonesia, the the Merdeka curriculum (in Indonesian: Kurikulum Merdeka) is now in use. Its goal is to provide local governments and schools back control over education management (Kemdikbud, 2020). Education management authority is manifested in the form of providing flexibility to schools and local governments in planning, implementing and evaluating educational programs implemented in schools. The Merdeka curriculum is also present as a policy option for developing an Merdeka curriculum for education units (Pratiwi, et.al, 2022; Ariga, 2022) to restore the learning crisis due to the Covid-19 pandemic.

Indonesia has seen disruptions in educational technology and learning loss as a result of switching from offline to online schooling during the pandemic (Daniel, 2020; Engzell, 2021). Research conducted by Engzell (2021) shows that few or no students make progress when learning from home. Learning loss is most pronounced among students from underprivileged families. Even the biggest challenge that occurred in the use of technology in education was during the covid-19 pandemic (Daniel, 2020; Ariga, 2022). The Merdeka curriculum development option in education units still refers to the principles of Merdeka Belajar policy set by the central government in an effort to overcome learning loss after the covid-19 pandemic and accelerate the national goals of education. Accelerating the achievement of the national goals of education is to improve the quality of Indonesian human resources that have superiority and competitiveness compared to other countries. Students with excellent levels of reasoning, particularly in reading and numeracy, and noble character make up the quality of superior and competitive human resources.

Currently, many schools have adopted the Merdeka curriculum although gradually. For example, in junior high school, it is applied to grade 7. The next year, it will be progressively introduced until this curriculum is used in every class (Swandari, & Jemani, 2023). However, implementing the independent learning curriculum is not easy. In line with the opinion that the change in curriculum has an impact on teachers as educators who have not been able to implement the new curriculum thoroughly. Teachers must really understand the new curriculum and its components if they want to implement it with the expected results (Mawati, et.al., 2023). The results showed that curriculum changes have a negative impact that can cause new problems such as decreased student achievement (Setiawati, 2022).

Changes in the Merdeka curriculum learning are divided into intracurricular, co-curricular and extracurricular learning. Whereas the Merdeka curriculum was developed as a curriculum framework that is more flexible, centers on fundamental material and develops students' uniqueness and abilities (Nafi'ah et al., 2023). The learning system in this independent learning program will be designed in such a way that it can shape student character and create enjoyable learning without having to be burdened with high value standards and achievement targets (Hattarina et al., 2022). In addition, there is differentiated learning which is one of the characteristics of the independent learning curriculum.

Simply expressed, differentiated learning refers to variations in learning activities depending on the features of the class and students, including the range of activities that students and teachers engage in, the method used to evaluate student learning outcomes (Tomlinson, 2017). Differentiated learning is learning that is implemented by adjusting the learning needs of students. Differentiated learning is not something new globally, the concept has been around since the No Child Left Behind (NCLB) era in early 2000. Essentially, differentiation is a complex set of principles that aim to maximize the learning opportunities of each learner and thus build inclusive classrooms (Valiandes, 2015; Vantieghem et al., 2020).

This should make classroom learning easier for teachers to design because it is tailored to students' abilities.

Teachers have the flexibility to choose various teaching tools so that learning can be tailored to the learning needs and interests of students. Teachers can use electronic formats (Pratiwi, 2022), tools, and various types of learning strategies so that it becomes an effective learning environment (Lapitan et al., 2021; Widana et al., 2018). Learning strategies, teaching materials, or evaluation tools used by teachers during teaching are outlined in the form of teaching modules. Teaching modules are learning tools or learning designs based on the curriculum that are applied with the aim of achieving predetermined competency standards (Nurdyansyah, 2018). Teaching modules have a major role to support teachers in designing learning (Nesri & Kristanto, 2020). In fact, there are still many teachers who do not fully understand the techniques for compiling and developing teaching modules, especially in the independent learning curriculum (Maulida, 2022). Therefore, it is important to conduct research to explore teachers' understanding and readiness in implementing the Merdeka Curriculum, especially in developing teaching modules that suit the needs of students.

The Merdeka curriculum seeks to give educators and educational institutions the freedom to organize and tailor instruction according to the requirements and characteristics of each individual student. But the truth is that a lot of teachers lack a thorough understanding of how to create engaging lesson plans within the parameters of this curriculum, which could make it more difficult to meet national education objectives, such as attempts to make up for learning losses brought on by the pandemic. Thus, this field research was conducted with the specific aim of observing and analyzing the suitability of the implementation of the Merdeka curriculum teaching module design with the learning process in the classroom.

METHODS

Field research is used in this study. According to Burgess (2003), field research is research that is carried out methodically by gathering data in line with the facts in the field. One of the junior high schools in Bandung City, West Java, served as the site for the research. The study was carried out between September 8 until October 30, 2023. The vice principal and two science teachers in the seventh grade served as the study's subjects. Interviews, observation, and documentation were used as collecting data methods. Document review sheets, observation sheets, and interview sheets were the study tools utilized. Three observations of the learning implementation process were conducted, and documents in the form of teaching modules created by science instructors in grade 7 were examined. Researchers interviewed a vice principal and one more science teacher as supporting information.

The teaching module review sheet is prepared based on four guiding principles of teaching module preparation which include (1) essential, (2) interesting, meaningful, and challenging (3) relevant and contextual, and (4) sustainable. The aspects of the teaching module document review can be observed in Table 1 below.

Table 1. Aspects of the Teaching Module Document Review

No.	Aspects observed	Indicator	Symptoms that appear
1	Essential	Each subject is conceptualized through experiential learning and across disciplines,	
2	Interesting, meaningful and challenging	Can foster interest and actively include students in learning, related to their cognitive and experience so that it is not too complex and not too easy for their age.	
3	Relevant	Relates to cognitive elements and prior experience and is appropriate to the time and place of the students.	

No.	Aspects observed	Indicator	Symptoms that appear
4	Sustainable	Learning activities should be linked according to students' learning phases (phase 1, phase 2, phase 3).	

The observation instrument for the learning implementation process uses the standard Operational Curriculum Development Guidelines in the Education Unit. The observation aspects related to the implementation of the Merdeka curriculum can be seen in Table 2.

Table 2. Observation Aspects of Implementation of Merdeka Curriculum at the Junior High School Level

No.	Aspects observed	Symptoms that appear
A	**Learning Process**	
1	Learning outcomes are broken down into learning objectives that are operational and concrete.	
2	Formulation of learning objectives including competencies and scope of material	
3	Learning is designed and implemented to build capacity to become lifelong learners.	
4	Learning is designed with learners' developmental stages in mind	
5	Learning is designed with learners' achievement levels in mind	
6	Learning is designed with learning needs in mind	
7	Learning is designed by considering the diverse characteristics of learners	
8	The learning process supports the development of competencies	
9	Relevant learning, which is learning that is designed according to the context, environment and culture of the learners, and involves parents and the community as partners.	
10	Continuous future-oriented learning.	
B	**Meaningful Learning**	
11	The knowledge to be learned must make sense to learners (the concepts learned and the activities performed can be connected to real conditions, including showing real problems that must be solved).	
12	Student-centered approach (when learners are more involved in the learning process, they will have a better understanding of the lesson objectives)	
13	Educators ask open-ended questions, encourage collaboration and group projects, and give tasks that exercise reflection and synthesis skills.	
14	Involving many references and learning sources (learning from various books, magazines, research journals, TV programs, the Internet, resource persons/professionals, etc.).	
C	**Assessment**	
15	Assessment is an integral part of the learning process	
16	Assessment is the provision of holistic information as feedback to learners.	
17	Assessments are designed to be fair, proportionate, valid and *reliable* to explain learning progress.	
18	Learning progress and learner achievement reports are simple and informative,	
19	Assessment results are used by learners, educators, education personnel, and parents as a reflection material to improve the quality of learning.	

RESULTS AND DISCUSSION

Results of Document Review of Teaching Modules

In general, all components in the teaching module have been fulfilled. The format of the teaching module is also in accordance with the Regulation of the Minister of Education, Culture, Research and Technology of the Republic of Indonesia Number 16 of 2022 concerning Process Standards in Early Childhood Education, Primary Education, and Secondary Education.

However, there are several findings in the document review of teaching modules at the junior high school level.

The first finding can be seen in Figure 1 below.

A. Model Pembelajaran	Discovery Learning, Metode : Praktikum, diskusi dan Penugasan (Project Based Learning)

Figure 1. Learning Models and Methods Listed in The Teaching Module

Based on Figure 1, if viewed from the aspect of learning experience, the discovery learning model and the method of practicum, discussion and assignment (*project-based learning*) are chosen in science learning. *Learning experience* is a number of learner activities carried out to obtain new information and competencies in accordance with the objectives to be achieved (Sanjaya, 2009). Student activities designed using the *discovery learning* model are in accordance with the topic to be taught, namely the classification of living things, especially Plantae. *Discovery Learning* is a learning approach that focuses on the process of discovery of knowledge and concepts by students through direct experience. This model is closely related to inquiry-oriented learning and students are not only given ready-made knowledge or facts, but are given the opportunity to discover the knowledge themselves (Wenning, 2011).

Based on Figure 1, the assignment method and *Project-Based Learning* (PBL) are two different things in the context of learning. The assignment method aims to improve the knowledge provided before or during the learning process or assessment for learning (Jeprianto et.al, 2021). *Assignments* tend to refer to learning activities that are primarily intended to encourage or solidify learning (Pashler et.al., 2007). Thus, assignment is a method used to assign tasks or work to students, with the aim of measuring their understanding or skills in a particular topic. Meanwhile, PBL is a typical form of cooperative, comparative and research-based learning techniques to solve a presented problem and is characterized by active learner involvement (Kokotsaki et al., 2016; Loyens et al., 2015; Novak & Krajcik in Markula & Aksela, 2022). In line with the characteristics of learning in science education, there is a research activity to find the truth (Eyisi, 2016). Learners are also encouraged to take a holistic approach in solving problems (Stokes & Harmer, 2018). In PBL, learners must participate in authentic research that is using and constructing their knowledge as scientists do (Novak & Krajcik in Markula & Aksela, 2022). Thus, PBL is a more comprehensive learning model in which students engage in a long-term project that involves research, collaboration, and application of knowledge to solve real-world problems. So, it would be more appropriate to say *project* method instead of *project-based learning* method. If in a teaching module there are *discovery learning* and PBL models, it is as if there are two learning models applied.

The second finding can be seen in Figure 2 below.

A. Tujuan Pembelajaran	Peserta didik dapat menjelaskan klasifikasi makhluk hidup (khususnya kingdom plantae) dan benda berdasarkan karateristik yang diamati, dalam bentuk media yang digemari peserta didik secara kreatif.

Figure 2. Learning Objectives Listed in The Teaching Module

The learning objective is that students can explain the classification of plants, so it would be better if teachers measure science process skills on the indicators of observing and classifying. Rustaman, et al (2007) explained that process skills consist of a number of skills that cannot be separated from each other, but there is a special emphasis in each of these process skills. The science process skills and sub-indicators in the KPS aspect of observing include using as many senses as possible and collecting relevant facts while the sub-indicators of classifying include recording observations separately, looking for differences and similarities, contrasting characteristics, looking for the basis of grouping, connecting the results of observations.

The third finding can be seen in Figure 3 below.

A. Profil Pelajar Pancasila	• Beriman dan bertaqwa kepada Tuhan YME dan berakhlak mulia • Rasa ingin tahu

Figure 3. Pancasila Learner Profile Listed in The Teaching Module

Based on the analysis of the teaching module review, only listed aspects of the Pancasila learner profile to be measured are faith in God and curiosity. The observation rubric on the aspect of faith in God is not included in the teaching module, only the aspect of curiosity is included in the assessment rubric by the science teacher. However, the elements of the Pancasila learner profile do not contain the 'curiosity' aspect. The aspects of the Pancasila learner profile include (1) faith, devotion to God Almighty and noble character; (2) global diversity; (3) mutual cooperation; (4) independence; (5) critical reasoning; and (6) creativity. The curiosity aspect can be replaced with critical reasoning. Critical reasoning or often known as critical thinking is divided into 2 elements, namely critical thinking itself and reflective thinking (Eğmir & Ocak**,** 2021). Critical thinking is about skills and dispositions (Altun & Yildirim, 2023). Critical thinking disposition according to Facione and Carrol (2013) and West et al, (2008) the definition of seven indicators of thinking dispositions, namely 1) truth-seeking is a disposition to actively seek or investigate the best knowledge in a particular context, 2) open-mindedness means being able to be open and tolerant of alternative (different) views, 3) analytical thinking can identify, relate to knowledge in solving problems that arise or can apply reasoning and evidence to solve problems, 4) systematic thinking, can organize systematically and thoroughly (in inquiry), 5) self-confidence is a disposition towards self-confidence in identifying questions and solving problems, 6) curiosity can learn, curiosity about new knowledge, 7) maturity is a disposition to mature, wise in making decisions. Curiosity is the sixth indicator in critical thinking disposition.

Observation Results of the Learning Process in the Classroom

The observation results show that 7 out of 10 aspects of the learning process or 70% of the learning process aspects, 3 out of 4 aspects of meaningful learning or 75% of the meaningful learning aspects, and 3 out of 5 aspects of assessment or 60% of the assessment aspects have been achieved. This shows that the implementation of learning as an implementation of the independent learning curriculum has been largely fulfilled.

At the beginning of learning activities, the teacher has tried to do *learning engagement* by asking questions related to Plantae material through pictures of plants that are often found in the environment around students. This is in accordance with the aspect of meaningful learning sub-aspect 13 educators ask open questions for students. *Learning engagement* is seen as a construct that has several aspects with three dimensions namely behavioral involvement, attention, and effort made by students in learning activities or tasks (Kong et al., 2003; Fredricks et al., 2004) and emotional involvement which means the level of interest in learning (Kong et al., 2003; Fredricks et al., 2004; Skinner and Pitzer, 2012). Learning something new is based on what is already known that is already known (*prior knowledge*). Previous research states that prior knowledge prior knowledge has an important influence on learning engagement (Rodrigues, 2007; Pecore et al., 2017). Prior knowledge can reduce cognitive load leading to better learning engagement (van Riesen et al., 2019). Research conducted by Dong et. al., (2020) shows that learning engagement is strongly influenced by prior knowledge. Cognitive load plays an important role in the relationship between prior knowledge and learning engagement through *help seeking behavior*. Students with higher *prior knowledge* require more adaptive learning instruments. However, there are still some improvements that need to be considered, for example in the learning process.

There are shortcomings in the learning process in terms of contextual adaptation, cultural alignment and partnerships with parents and communities, and the absence of sustainability-focused education. In terms of meaningful learning, the curriculum does not frame learning activities as real-world problems that require solutions. The learning process and meaningful

learning by presenting real problems can be included in teaching materials or handouts, worksheets or learning activities. The learning method chosen is appropriate, namely the practicum method. In line with previous research that how to overcome learning difficulties about plant classification can be done with practicum. In line with previous research that to overcome problems in learning plant classification is to emphasize the adequacy of theoretical background and practicum activities (Van, 2003; Songer et.al., 2009). However, based on observations, the material *handout* presented is still monotonous, there is no innovation in its presentation so that it does not support the learning process. Teachers should not present monotonous material handouts. It would be better if the teacher can present *handouts* that contain simulation videos, or animated simulations, educational websites, the latest information about technology in plant classification, and so on. There have been many studies that provide solutions to overcome the problems that exist in teaching plant taxonomy. Some of them focus on innovations in terms of teaching content, teacher and student relationships or reducing teaching time (Quave, 2014, Wynn et.al, 2017).

Based on the observation aspect related to meaningful learning, sub-aspect 11 is that the knowledge learned makes sense, the concepts and activities carried out can be connected to real conditions but have not presented real problems in plant classification material. Teaching plant taxonomy is an important part of botany in universities and is the focus of all reforms of this branch of education (Quave, 2014; Songer, Kelcey, and Wenk, 2009). It is recommended that teachers present real problems related to plant classification. This is especially important given the many misconceptions related to this such as many children aged 10 to 12 years do not consider plants as living things. Many children from this category think that plants come from shops or wildflowers grow in fields just because humans plant them or because plants are part of the soil (Anderson, Ellis, & Jones, 2014; Bell, 1981; Gatt, et.al, 2007). Middle school students (13-15 years old) even noted that students do not consider plants as living things (Hersey, 2005). Other research shows that primary and secondary students have problems classifying and understanding the diversity of living things (Anderson, Ellis, & Jones, 2014; Trowbridge & Mintzes, 1988). The general findings of these studies suggest that students' conceptions of plants are unscientific. The main misconceptions reported in the studies are that students make direct connections between some seedless plants and invasive plants, vascular plants and non-vascular plants, gymnosperm plants and angiosperm plants (Hersey, 2005).

Learning that presents real problems and is oriented towards sustainability is very important to be given to students. This is because as the population increases, the ability of nature to produce something is decreasing and human needs are increasing. This leads to small actions that can damage nature (Liobikiene & Poškus, 2019). Based on these conditions, flexible individuals who can learn lifelong, generate new information, develop themselves, manage vast information and data sets, and solve complex problems are needed (Kocak & Goksu, 2020; Stehle & Peters-Burton, 2019). *Education for Sustainable Development* (*ESD*) is a lifelong learning process. ESD carries the concept of instilling human values in people (Gericke, 2022). ESD also emphasizes the education of knowledge, skills, values and insights which are one of the basic foundations of sustainable development (Mahat et al., 2020).

Finally, the assessment component lacks feedback for students and the results are only used by teachers, limiting opportunities to improve the quality of learning. These findings indicate important areas for improvement to align the curriculum with the goal of holistic, student-centered education.

Research conducted by Hasanah, et.al. (2022) states that teachers have an important role in the process of curriculum development and implementation in schools so that teachers are expected to always be involved in curriculum development activities. In the context of the Merdeka curriculum, teacher preparation includes their mental readiness and skills in implementing this new learning system so that it can provide optimal learning experiences for

students. Teachers have 4 general functions, namely: planning learning objectives; organizing various learning resources to realize learning objectives; leading, which includes motivating, encouraging and stimulating students; supervising everything, whether it has functioned properly or not in the context of achieving goals (Prihartini, et.al., 2019; Septiana & Hanafi, 2022). Creating teaching modules is one of the functions of teachers planning and realizing learning objectives and is included in the pedagogical competence of teachers that need to be developed. This is necessary so that the teacher's teaching techniques in the classroom are more effective, efficient, and do not get out of the discussion of achievement indicators (Maulida, 2022). In preparing teaching modules, teachers need to master the four pillars of digital literacy to become excellent teachers, because digital literacy is now an inseparable part of learning. With adequate digital literacy, teachers can be better prepared to implement the Merdeka Curriculum, especially since learning tools from the government are available in digital form in the Merdeka Mengajar application and the Kemdikbud website (Septiana and Hanafi, 2022).

Based on the supporting data in the form of interview results, it was found that the science teachers interviewed had never participated in Merdeka curriculum training. This causes teachers to have difficulty compiling teaching modules. Science teachers have also tried to use differentiated learning in the classroom in the process. The teacher has never tried to use differentiated learning from the content and product aspects. Training related to the Merdeka curriculum is considered important because the independent learning policy is implemented to accelerate the achievement of the national goals of education, namely increasing the quality of Indonesian human resources that have excellence and competitiveness compared to other countries. The quality of superior and competitive human resources is realized in students who have noble character and have a high level of reasoning, especially in literacy and numeracy (Hasanah et.al., 2022).

Based on the results of interviews with other science teachers, it was found that the teacher had difficulty determining what differentiated learning actually looked like in the Merdeka curriculum. The teacher concerned has tried to do differentiated learning in terms of process. The teacher divides students into groups based on students' initial abilities. The teacher also assesses products based on students' abilities. But so far, the teacher is still unsure whether or not the implementation of differentiated learning is in accordance with what is intended in the Merdeka curriculum. Science teachers have also tried to prepare learning materials and student worksheet that can explore students' competencies.

Another interview was conducted with the school vice principal. The curriculum implemented in the school is the independent learning curriculum. Actually, the school wants to choose independent change. If the independent sharing is specifically for contract schools. The school has not yet met the requirements for a driving school because it is constrained by the age of the principal who will reach retirement in the next 3 years. In terms of facilities and infrastructure, this school is very supportive of the implementation of the independent learning curriculum, 33 classes, several labs such as the science lab, computer lab, Islamic lab, library, hall room, 2 *meeting rooms*, toilets, garden and School Health Unit. In terms of human resources, it is still lacking in terms of the availability of informatics teachers, counseling guidance teachers, and regional language teachers. The efforts that have been made from the school are providing *in-house training* for teachers for self-development, independent learning carried out by teachers through the Merdeka Teaching Platform (PMM). Managerially, it has included a self-development program with various activities internally, namely *in house training* and external activities carried out by Subject Teacher Consultation (in Indonesia: Musyawarah Guru Mata Pelajaran). MGMP activities are carried out 2 times a year. The biggest challenge is that this school was a *piloting* school during the implementation of the 2013 curriculum, so it was a bit difficult to adapt to the Merdeka curriculum. However, in the

future, this school is eager to become a school that can choose to share the Merdeka curriculum. The school will continue to improve its human resource readiness.

The limitations of this research are that it only observes the stages of implementing the Merdeka curriculum in one school and only two science teachers in intra-curricular teaching activities, the interview is supported by the head of the curriculum. It would be better if the next research conducted research until the research subjects reached the sample saturation point. In addition, future researchers can examine in depth how learning interactions between teachers and students, or students with students, or students with learning resources. Future research can also observe the implementation of P5 in co-curricular activities.

CONCLUSION

Based on the results of the study, it can be concluded that the overall format of the preparation of teaching modules is in accordance with the standards set by the Ministry of Education and Culture. However, there are a number of areas that require attention, including learning models, learning objectives, and the characteristics of Pancasila students who wish to be ingrained in pupils. The majority of the science learning process implementation in the Merdeka curriculum has been done in compliance with the Merdeka curriculum's learning process criteria. A total of 7 out of 10 aspects of the learning process or 70% of the learning process aspects, 3 out of 4 aspects of meaningful learning or 75% of the meaningful learning aspects, and 3 out of 5 aspects of assessment or as much as 60% of the assessment aspects have been achieved.

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