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Kurikulum Merdeka: Implementation and Effect on Learning Loss in Chemistry Caused by Covid-19 Outbreak

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Abstract: This research aimed to analyze the phenomenon of learning loss and its revitalization in chemistry learning in an effort to support the independent learning curriculum and find out the implementation of *merdeka belajar* in schools. The sample of this research was 227 students and 17 high school chemistry teachers in the Bogor area which were determined by cluster random sampling. The method used is descriptive with a survey approach. The instruments used in this study consisted of: student and teacher questionnaires and documentation. The data analysis technique used is quantitative descriptive. The results of the study show that: 1) the implementation of *merdeka belajar* in high schools in the Bogor area is included in the independent changing and independent sharing categories. 2) the percentage of the average score of the results of the student questionnaire is 62.4% (enough) and the teacher's questionnaire is 72.7% (good). 3) Based on statistical tests, a significance value of 0.000 ≥ 0.05 is obtained. So it can be concluded that the implementation of *merdeka belajar* at senior high schools in the Bogor area did not have an effect on the phenomenon of student learning loss in chemistry subjects.

Keywords: learning loss, *merdeka belajar*, learning chemistry.

Abstrak: *Tujuan dari penelitian ini adalah untuk menganalisis fenomena learning loss dan revitalisasinya pada pembelajaran kimia dalam upaya mendukung kurikulum merdeka belajar serta mengetahui implementasi kurikulum merdeka di sekolah. Sampel penelitian ini adalah 227 siswa dan 17 guru Kimia SMA di wilayah Bogor yang ditentukan secara cluster random sampling. Metode yang digunakan adalah deskriptif dengan pendekatan survei. Instrumen yang digunakan dalam penelitian ini terdiri dari: angket siswa dan guru serta dokumentasi. Teknis analisis data yang digunakan adalah deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa: 1) implementasi kurikulum merdeka di SMA di wilayah Bogor termasuk kategori mandiri berubah dan mandiri berbagi. 2) persentase skor rata-rata hasil kuesioner siswa adalah 62,4% (cukup) dan kuesioner guru adalah 72,7% (baik). 3) Berdasarkan uji statistika diperoleh nilai signifikansi 0,000 ≥ 0,05. Sehingga dapat disimpulkan bahwa implementasi kurikulum merdeka pada SMA di wilayah Bogor, tidak memberikan efek terhadap fenomena learning loss siswa pada matapelajaran kimia.*

Kata kunci: *learning loss, merdeka belajar, pembelajaran kimia.*

▪ INTRODUCTION

The impact of the Covid-19 pandemic has caused many significant obstacles in the learning process in education units. The 2013 curriculum used before the pandemic became the only curriculum used by educational units in the learning process. During the 2020 to 2021 pandemic, the Ministry of Education and Culture issued a policy to use the 2013 Curriculum and the Emergency Curriculum (simplification of the 2013 Curriculum) to become the main reference for educational units. Furthermore, from 2021 to 2022 the Ministry of Education and Culture will issue a policy for using the

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Kurikulum 2013, *kurikulum darurat*, and *kurikulum merdeka* in several educational units.

Merdeka belajar is not implemented simultaneously and massively, this is in accordance with the policy of the Ministry of Education, Culture, Research and Technology (Kemendikburistek) which gives flexibility to educational units in implementing the curriculum. In Kepmendikbudristek No. 56 of 2022 concerning Guidelines for Implementing Curriculum in the framework of Learning Recovery (*merdeka belajar*), it is stipulated that "education units need to develop a curriculum with the principle of diversification in accordance with the conditions of the educational unit, regional potential, and students. Based on this, we can see that the implementation of *merdeka belajar* is not rigid and can adjust to indicators of achieving learning objectives.

The flexibility of the independent learning curriculum must still refer to national education goals. This is stated in the Law where in article 3 of Law Number 20 of 2003 concerning the National Education System reads that the purpose of national education is to develop the potential of students so that they become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. In the law, the first thing that is stated is to develop the potential of students. Various efforts need to be maximized so that these goals can be achieved.

In its implementation, *merdeka belajar* for the SMA/MA education unit level is categorized into three groups, namely: 1) the independent learning category, namely schools applying the principles of an independent curriculum but still using the revised 2013 curriculum or emergency curriculum; 2) independent changes, namely schools already use independent curriculum structures and independent curriculum principles but the teaching materials are still adapting from other schools or from independent teaching platforms; and 3) self-sharing, that is, schools already use *merdeka belajar* structure and independent curriculum principles and develop their own teaching tools (Kemdikbudristekdikti, 2022). This categorization is adjusted to the readiness of each school.

One of the expected impacts of implementing this independent curriculum is that it can reduce or minimize phenomena learning loss. learning loss is an event of general and/or specific loss of knowledge and skills, or the occurrence of a setback in the academic process due to certain conditions (Kurniawati, 2022). Learning loss is the absence of optimal learning processes carried out in schools (Li et al., 2020). The learning process that is not optimal will have implications for learning outcomes. Learning loss will have an impact on the quality of human resources (Kashyap et al., 2021; Yadav, 2021; Zakharova et al., 2021). Besides thatlearning loss also causes a decrease in students' cognitive, affective, and psychomotor abilities (Engzell et al., 2021; Khan & Ahmed, 2021; Kurniawati, 2022). Difficulties and concerns related to the implementation of this learning process can result in loss of opportunities in learning (learning loss), particularly decreased cognitive achievement (Kim&Park, 2021). Because of that the Ministry of Education and Culture also provides several solutions that can minimize learning loss and improving the competence of educators including teacher sharing programs, Online Technical Guidance Series, Webinar Series, Free quotas, BOS & BOP Relaxation, PAUD Teacher Room and Family Friends. Students

are given learning through TVRI, Studying at RRI, and Learning Houses (Jojor, 2022). However, the solutions provided by various programs have not had a significant impact (Jojor, 2022; Sosial et al. 2021). Furthermore, the government issued guidelines for implementing the curriculum for special conditions education units (emergency curriculum) (Jojor, 2022). However, even this policy is not optimal (Jojor, 2022; Arifin, 2021; Supriatna, 2021). The government is trying to create an independent curriculum (Jojor, 2022).

Merdeka belajar is a curriculum with various intra-curricular learning where the content will be more optimal so that students have enough time to explore concepts and strengthen competence. Teachers have the flexibility to choose various teaching tools according to the learning needs and interests of students (Dirjen PAUD, 2022). The Merdeka Curriculum is a program that is expected to make recovery in learning. There are 3 characteristics offered, including project-based learning, learning on essential material and a more flexible curriculum structure (Jojor, 2022), integrating several scientific fields. The implementation of *merdeka belajar* in several driving schools was carried out quite well (Aisyah, 2019). The quality of learning outcomes is maintained and avoidedlearning loss (Assiddiqi, 2021). Therefore educators, especially chemistry teachers are also a driving force to adapt to the new paradigm being offered. This is because Chemistry is an important subject in science and contains abstract concepts (Zhou, Hu, Gao, 2010). However, the condition that occurs is that not many teachers understand and implement *merdeka belajar* optimally, and do not ensure learning practices are student-centered so that the learning loss cannot be avoided.

There have been many studies that examine the learning loss phenomena, including Andriani, et al (2021) who concluded that learning loss in online learning during the corona pandemic occurred because of the gap that occurred between students and lecturers, students and students, and the completeness of teaching materials in lectures. Donnelly & Anthony (2021) under the title learning loss During Covid 19: An Early Systematic Review. The results of the study looked at the impact related to student learning progress during the covid 19 pandemic. Jojor and Sihotang (2022) concluded that the application of the "*merdeka belajar*" at the educational unit level could reduce learning loss during the COVID-19 pandemic. Implementation of *merdeka belajar* can have an impact on learning recovery, developing creativity, analytical thinking, increasing motivation (Susani, 2022).

Based on the results of previous studies, it can be seen that there has been no study related to the implementation of *merdeka belajar* on learning loss phenomena in chemistry learning. Therefore, the authors are interested in examining how the implementation of *merdeka belajar* and its influence on learning loss in chemistry learning at SMA/MA in the Bogor Region.

▪ METHOD

This research was conducted at a high school in the Bogor area in the odd semester of the 2022/2023 school year, namely September - November 2022. The method used is descriptive with a survey approach. According to Suryana (2010) descriptive research method is a method used to find the elements, characteristics, and characteristics of a phenomenon that begins with collecting, analyzing, and interpreting data. The population of this study were all Chemistry teachers and high school students

in the Bogor area. While the sample of this study were 227 students and 17 high school chemistry teachers at SMA A Parung and SMA B Bogor City, which were determined cluster random sampling. The instruments used in this study consisted of: student and teacher questionnaires as well as documentation of student learning outcomes. The student questionnaire was used to see how the implementation of *merdeka belajar* influenced the learning loss phenomenon. The teacher questionnaire was used to find out how *merdeka belajar* was implemented in schools. The student questionnaire consists of 35 statement items and the student questionnaire consists of 35 statement items prepared using a Likert Scale. The teacher questionnaire consists of 3 aspects, namely aspects of online learning, learning loss, and learning outcome. The teacher questionnaire before being used was first validated by 1 expert.

The student questionnaire also consists of 3 aspects, namely aspects of online learning, learning loss, and learning outcome. Prior to use, the student questionnaire was validated, both expert validation and empirical validation. Expert validation is carried out by 1 expert lecturer. The results of empirical validation for students who have used *merdeka belajar* on campus. Based on the results of the validation, 35 valid questions were obtained and 8 invalid items, with a reliability value of 0.914 (very reliable category). The student questionnaire grid can be seen in table 2 below. The data obtained was then analyzed. The data analysis technique used was quantitative descriptive using SPSS version 23. Questionnaire data were interpreted into very good (81-100), good (61-80), sufficient (41-60), poor (21-40) categories. very less (0-20) (Arikunto, 2016).

▪ RESULT AND DISSCUSSION

Questionnaire Results on Student Representatives at Bogor High School

Data from questionnaire results on student representatives in high schools in Bogor can be seen in table 1:

Table 3. Students' Questionnaire Results from Bogor Region

Aspect	Indicator	% Average	Category
Online Learning	1. Quality of material delivery	53.1	Insufficient
	2. Learning strategy used	61.7	Sufficient
	3. Clarity of material	81.1	Very good
	4. Quality of teaching	79.6	Good
	5. Student involvement and activeness	65.3	Adequate
Learning Loss	1. Learning resources	67.3	Good
	2. Maintain student learning engagement	57.0	enough
	3. Providing learning alternatives for students	70.8	Good
	4. Supports family involvement	67.1	Good
	5. Organizing additional classes	65.3	Adequate
Learning outcome	1. Verbal information	51.7	Insufficient
	2. Intellectual	63.2	Adequate

	3. Cognitive strategies	46.9	Insufficient
	4. Attitude Strategy	56.2	Adequate
	5. Psychomotor ability	49.3	Insufficient
	Average	**62.4**	**Adequate**

Based on table 1 it can be seen that the average score percentage of the results of the student questionnaire for the Bogor area is 62.4% and is included in the sufficient category. Where the highest average score was obtained on the material clarity indicator, which was 81.1 (very good category) and the lowest average score was obtained on the cognitive strategy indicator, which was 46.9% (poor category).

2) Questionnaire Results for Teacher Representatives at Bogor High School

Data from student questionnaire results for teacher representatives at SMAs in Bogor can be seen in table 4 below

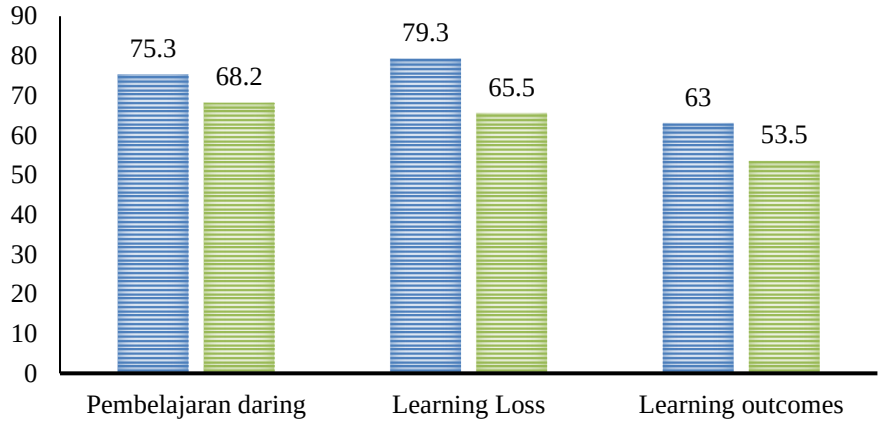
Table 4. Teacher Questionnaire Results from Bogor Region

Aspects	Indicators	%Average	Category
Online Learning	1. Learning strategies used	75.0	Good
	2. Learning strategies used	76.5	Good
	3. Clarity of material	74.3	Good
Learning Loss	1. Learning resources	79.4	Good
	2. Maintain student learning engagement	82.4	Very good
	3. Providing learning alternatives for students	73.9	Good
	4. Providing learning alternatives for students	73.5	Good
	5. Facilities during distance learning	82.4	Very good
	6. Organizing additional classes	86.8	Very good
Learning Outcome	1. Verbal information	63.2	Sufficient
	2. Intellectual prowess	66.9	Good
	3. Intellectual prowess	61.8	Fair
	4. Attitude Strategy	64.7	Enough
	5. Cognitive strategies	58.3	Sufficient
	Average	**72.7**	**Good**

Based on table 2, it can be seen that the percentage of the average score on the results of the teacher questionnaire for the Bogor area is 72.7% and is included in the good category. Where the highest average score is obtained on the indicator of holding additional classes, which is equal to 86.6% (very good category) and the lowest average score is obtained on the cognitive strategy indicator, which is equal to 58.3% (sufficient category).

Independent curriculum implementation data and its influence on learning loss known through questionnaire instruments students and teachers. The high schools representing schools in the Bogor area are SMAN A Parung and SMAN B Bogor City. The respondents involved were 17 chemistry teachers and 227 class X students. The

aspects measured in this questionnaire consisted of three aspects, namely aspects of online learning, learning loss, and learning outcomes. Data from the results of the questionnaire for SMA/MA students and teachers in the Bogor area for each aspect of the questionnaire can be seen in Figure 2.



Gambar. 2. Student (green) and teacher (blue) questionnaire results

Based on Figure 2 above, it can be seen that in the online learning aspect, an average score of 75.3% was obtained for the teacher's questionnaire and 68.2% for the student's questionnaire. This means that the implementation of online learning is assessed by teachers and students in the good category (Arikunto, 2006). Online learning is learning that is carried out without face-to-face meetings, but through platforms that are available both in the delivery of subject matter, communication, and evaluation (Sofyana & Abdul, 2019). Online learning is also learning that uses an internet network with accessibility, connectivity, flexibility, and the ability to bring up various types of learning interactions (Sadikin & Hamidah, 2020).

The aspects of online learning that are measured in the student questionnaire consist of 5 indicators, namely indicators of the quality of delivery of material, learning strategies used, clarity of material, quality of teaching, and student involvement and activity. Based on table 1 it can be seen that the percentage of the average score on the indicator of the quality of delivery of material is 53.1% and is included in the less category (Arikunto, 2006). This is because the delivery of chemistry material has not been able to accommodate the characteristics of chemistry subjects which contain abstract concepts, concrete examples (Marsita et al, 2010). The percentage of the average score on the learning strategy indicator used is 61.7% and is included in the sufficient category (Arikunto, 2006). This may be because the learning strategy chosen by the teacher has not been able to assist students in understanding abstract chemical material and tends to require direct practicum activities. The percentage of the average score on the material clarity indicator is 81.1% and is included in the very good category (Arikunto, 2006). This means that students can easily understand the material explained by the teacher. The percentage of the average score on the teaching quality indicator is 79.6% and is included in the good category (Arikunto, 2006). The quality of teaching can be seen from how skilled the teacher is in determining methods, strategies, and media that suit the needs of students and in accordance with the principles in

merdeka belajar. The percentage of the average score on the indicator of student involvement and activeness is 65.3% and is included in the sufficient category (Arikunto, 2006). This may be because online learning has limitations in engagement between students and teachers or students with the media. Therefore, learning that is done online is less meaningful.

The aspects of online learning that are measured in the teacher's questionnaire consist of 3 indicators, namely indicators of the learning strategy used, student involvement and activity, and subject achievement. Based on table 2 it can be seen that the percentage of the average score on the indicator of the learning strategy used is 75.0% (good category), on the indicator of student involvement and activeness is 76.5% (good category), and on the indicator of subject achievement is 74.3% (good category). This shows that online learning according to teachers is effective and helps the learning process during the pandemic and after the covid pandemic. This means that chemistry teachers in the Bogor area are of the opinion that online chemistry learning has been carried out properly and effectively in helping students learn chemistry. this is in accordance with the opinion of Arikunto (2006) which states that an acquisition score of between 66% -79% is in the good category.

On the learning loss aspect obtained an average score of 79.3% for the teacher's questionnaire and 65.5% for the student's questionnaire. This means that teachers and students think that the implementation of an independent curriculum in chemistry learning can have a good effect on efforts to minimize learning loss phenomena (Arikunto, 2006). learning loss is an event of general and/or specific loss of knowledge and skills, or the occurrence of a setback in the academic process due to certain conditions (Kurniawati, 2022). Before the pandemic, learning loss associated with summer vacations, when academic performance declines and achievement gaps increase among students (Hevia et al., 2021). This is in line with the results of research conducted by Jojor (2022) which states that the Merdeka curriculum at the education unit level can reduce learning loss during the COVID-19 pandemic.

Learning loss aspect measured in the student questionnaire consists of 5 indicators, namely indicators of learning resources, maintaining student learning involvement, providing learning alternatives for students, supporting family involvement, and organizing additional classes. Based on table 4.13 it can be seen that the percentage of the average score on the learning resources indicator is 67.3% (good category). The indicator of maintaining student learning engagement is 57.0% (enough category). The indicator of providing learning alternatives for students is 70.8% (good category). The indicator supporting family involvement is 67.1% (good category). And the indicator of holding additional classes is 65.3% (enough category). This shows that the implementation of *merdeka belajar* for efforts to overcome the learning loss in post-pandemic chemistry learning is included in the pretty good category (Arikunto, 2006).

While learning loss aspects measured in the teacher's questionnaire consisted of 6 indicators, namely indicators of learning resources, maintaining student learning involvement, providing learning alternatives for students, supporting family involvement, and holding additional classes. Based on table 4.16 it can be seen that the percentage of the average score on the learning resources indicator is 79.4% (good category), on the indicator maintaining student learning engagement is 82.4% (very good category), on the indicator providing alternative learning for students 73 .9%

(good category), the indicator of providing alternative learning for students is 73.5% (good category), the indicator of facilities during distance learning is 82.4%% (very good category), and the indicator of holding additional classes is 86.6% (very good category). This shows that the implementation of an independent curriculum can have a positive influence on the learning loss students in chemistry subjects after the covid 19 pandemic.

As for the third aspect, namely learning outcomes aspect obtained an average score of 63.0% (good enough category) for the teacher's questionnaire and 53.5% (poor category) for the student questionnaire. This means that the teacher believes that the implementation of *merdeka belajar* in chemistry learning can have a fairly good effect on learning outcomes chemistry subject. While students think that the implementation of *merdeka belajar* in chemistry learning can have an unfavorable effect on learning outcomes chemistry subject.

Learning outcomes is the expected learning achievement after participating in chemistry learning. This achievement includes the cognitive, affective, and psychomotor domains. Learning outcomes measured on the student questionnaire consists of 5 indicators, namely indicators of verbal information, intellectual skills, cognitive strategies, attitude strategies, and psychomotor abilities. The average percentage on verbal information indicators was obtained at 51.7% (poor category). The average percentage on the intellectual skills indicator was obtained at 63.2% (enough category). The average percentage on cognitive strategy indicators is 46.9% (poor category). The average percentage on the attitude strategy indicator was obtained at 56.2% (enough category). And the average percentage on the psychomotor ability indicator is 49.3% (less category).

While learning outcomes measured on the teacher's questionnaire consisted of 5 indicators, namely indicators of verbal information, intellectual skills, cognitive strategies, attitude strategies, and psychomotor abilities. The average percentage on verbal information indicators was obtained at 63.2% (enough category). The average percentage on the intellectual skills indicator is 66.9% (good category). The average percentage on cognitive strategy indicators is 61.8% (enough category). The average percentage on the attitude strategy indicator was obtained at 64.7% (enough category). And the average percentage on the psychomotor ability indicator was obtained at 58.3% (enough category).

In addition to the data obtained from student and teacher questionnaires, research was also carried out to strengthen the results focus group discussion (FGD) to school principals and chemistry teachers. Based on the results of the FGD, it was stated that the SMA/MA schools implementing *merdeka belajar* in the Bogor area were varied, some implementing the curriculum in the independent category changed, some in the independent category sharing and some were driving schools. The chemistry learning that has been carried out has applied the principle of a sustainable future orientation, learning is designed according to the context, environment and culture of students, and involves parents and the community as partners. Chemistry learning is carried out oriented towards creating students who fear God Almighty, are independent, diverse, work together, creative, and critical. Chemistry learning is done by applying project learning models, problem-based learning, inquiry, and contextual learning. The teacher has implemented a holistic assessment, namely conducting an initial, formative,

summative assessment. As well as learning also prioritizes learning completeness rather than learning outcomes. Moreover, the implementation of *merdeka belajar* in the Bogor area is quite good.

Based on statistical test results data relating to the acquisition of the results of the analysis of influence learning loss in learning chemistry using *merdeka belajar* on the learning outcomes of chemistry subjects at SMAN A Parung shows F_{calc} = 0.742, and p-value = 0.460/2 = 0.230 > 0.05 or means that H0 is accepted. This means that there is no influence of learning loss in learning chemistry using a curriculum that is independent of the learning outcomes of chemistry subjects. Thus, there is no influence learning loss in chemistry learning using *merdeka belajar* for the learning outcomes of chemistry subjects obtained by SMAN A Parung Bogor. Meanwhile, the sample statistical test results in the Bogor area are F_{calc} = 0.316, and p-value = 0.753/2 = 0.376 > 0.05 or it means that H0 is accepted. This means that there is no influence learning loss in learning chemistry using a curriculum that is independent of the learning outcomes of chemistry subjects. Thus, there is no influence learning loss in chemistry learning using *merdeka belajar* for the learning outcomes of chemistry subjects obtained by SMAN B Bogor City.

▪ CONCLUSION

Based on data analysis and discussion, it can be concluded that: 1) the implementation of *merdeka belajar* at SMA/MA in the Bogor area is adjusted to the readiness of the school so that in its implementation there are those that fall into the category of independent change and independent sharing. 2) the average score percentage of the results of the questionnaire for high school/MA representative students in the Bogor area is 62.4% (enough). 3) the average score percentage of the results of the questionnaire for SMA/MA representative teachers in the Bogor area is 72.7% (good). 4) Based on statistical tests, it was stated that between the implementation of *merdeka belajar* and learning outcomes in chemistry subjects there was no significant relationship with the learning loss phenomenon of SMA/MA students in the Bogor Region. This is evidenced by a significance value of 0.000 ≥ 0.05. Moreover, it can be concluded that the implementation of *merdeka belajar* at SMA/MA in the Bogor area has no effect on the phenomenon of student learning loss in chemistry subjects.

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