



Effectiveness of Implementing the Independent Learning Curriculum in Chemistry Learning Processes at High Schools in Makassar City

Khaerunnisa¹, Muhammad Anwar¹, Ahmad Fudhail Majid^{1*}

¹Universitas Negeri Makassar, Makassar 90224, Indonesia

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*Corresponding author:

fudhailchemist@unm.ac.id

Abstract

This research aims to understand how the implementation of the independent learning curriculum is applied in the chemistry learning process and to determine the effectiveness of this curriculum's application in the chemistry learning process. The sample for this research is Class X.1 which consists of 30 students and 4 chemistry teachers who are the subjects of this research. Data collection was carried out by distributing questionnaires to chemistry teachers to understand how the independent learning curriculum is applied in the chemistry learning process and by administering a posttest to students to determine the effectiveness of the curriculum's application in the chemistry learning process. This research uses descriptive statistical analysis. The results of the descriptive statistical analysis of the questionnaire on the application of the independent learning curriculum obtained an average score of 81.75 with very good criteria, and the results of the descriptive statistical analysis of student learning outcomes obtained an average score of 78.1 with satisfactory criteria. Based on these analysis results, it can be concluded that the implementation of the independent learning curriculum in the chemistry learning process in class X.1 at SMAN 9 Makassar has been very well applied and the effectiveness of the independent learning curriculum in the learning process in class X.1 at SMAN 9 Makassar has been effective.

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1. INTRODUCTION

The historical development of curriculum education in Indonesia over time, from pre-independence curriculum to present. The curriculum in Indonesia has undergone many changes and developments, with 10 revisions, starting from (1945-1965), which can be divided into 3 different periods, namely the 1947 curriculum, '1952 studies and the 1964 curriculum. Furthermore (1966-1998) can be divided into 4 separate periods, namely the 1968 curriculum, the 1975 curriculum, the 1984 curriculum and the 1994 curriculum. It can then be divided into 3 different periods, namely the 2004 curriculum, the 2006 curriculum and the 2013 curriculum. Each program has the same goal of improving the quality of Indonesian education and training a more competent generation (Ananda & Hudaidah, 2021). Currently, there are curriculum which is recently ini

developed what is known as an independent learning curriculum.

The Independent Learning Program is a recently launched program that has generated many discussions among various stakeholders regarding its implementation (Sekretariat GTK, 2019). Independent learning program is also one of the program concepts that requires student independence (Manalu et al., 2022). In the 2013 curriculum, students are expected to become more creative, problem-solvers, and more dynamic and innovative (Nurhasanah et al., 2021). The 2013 curriculum for all primary and secondary educational institutions is one of the central and strategic steps to strengthen Indonesia's identity towards becoming a cultural nation (Shandi, 2018).

There are some differences between the self-directed learning program and the 2013 program,

particularly in the target skills, based on the use of core skills (KD) and the use of core skills core as target skill. Unlike stand-alone curriculum, the term learning outcomes (CP) is used to refer to target skills. Learning outcomes in the learning process include the knowledge, attitudes, and skills necessary to achieve the learner's competencies at each stage. In addition, the curriculum independent learning program uses formative assessment and summative assessment in terms of assessment, the independent learning program also uses formative assessment, and the results are reflected in learning development according to students' abilities. The stand-alone program includes an assessment of the Pancasila learner profile strengthening project, which was not included in the 2013 program. Assessment of attitudes, knowledge and skills is one of the features of curriculum assessment in 2013, although there is no separation between assessment of attitudes, knowledge, and skills in independent curriculum assessment (Rohimajaya et al., 2022). Learning models encourage students to actively learn and directly participate in the learning process. There are many different types of learning models that can be used for independent learning programs, such as problem-based learning, discovery learning, project-based learning, etc (Lestari et al., 2023).

The importance of improving educational planning can be seen from many angles (Pratikno et al., 2022). One of them is changing the curriculum based on Indonesia's educational goals, as stated by Minister of Education and Culture Nadiem Makarim in the circular of the Minister of Education and Culture. Culture No. 1 of 2020 on politics Merdeka Belajar, signed directly by Secretary General Ainun Na. In my opinion, this policy is suitable for all levels of education, from elementary school (SD), middle school (SMP) to high school (SMA) across Indonesia to implement their own curriculum. There should be no difference at any level, whether SD, SMP or SMA. In addition, the implementation must also be carried out simultaneously, not partially or only partially.

The implementation of the Merdeka Learning Curriculum in Indonesia has been adopted by over 300,000 schools (Caesaria, 2024). In South Sulawesi, there are 559 high schools (SMA) and 234 vocational schools (SMK) that have adopted this curriculum (Humas sulseprov, 2024). In the city of Makassar, several schools have also started implementing the Merdeka Learning Curriculum. This program aims to provide schools with the flexibility to design their curriculum and manage the learning process according to the needs and potential of their students.

Several schools in Makassar have implemented independent programs, including public high schools. Furthermore, to fulfill the mandate of Law No. 20 of 2003

relating to the National Education System and Government Regulation No. 32 of 2013 relating to the Amendment of Government Regulation No. 19 of 2005 relating to National Education Standards aim to achieve national education goals in general and general education in particular.

The implementation of the curriculum is one of the most important issues in the education sector throughout the curriculum cycle (Aytan, 2016; Suyanto, 2018). Implementation of the learning independence curriculum in some schools in Makassar are already running for 3 years and has been implemented. This information was obtained by researchers from interviews about the implementation of the independent learning curriculum with several teachers at the State Senior High School, namely: 1) The average teacher has used a teaching module as a substitute for the lesson plan commonly used in the 2013 curriculum. 2) The implementation of learning assessment has begun to be implemented when the independent learning curriculum was first implemented even though it requires adjustment to school conditions. Implementation of the Merdeka Belajar Program, the National Examination was eliminated, and a new program emerged, namely the National Assessment. The National Assessment is an evaluation material for student and school learning outcomes to see the quality of the school's quality (IQBAL, 2024). 3) Project activities to strengthen the Pancasila student profile are school activities that only exist in the independent study program, this activity is carried out twice a week. However, it often adjusts the time and conditions. 4) In the learning process, the 2013 program generally applies the scientific method in all subjects. This is different from the vocational program that uses a differentiated approach based on the students' abilities (Wulandari, 2020). This was done by the subject teachers. 5) Regarding assessment, chemistry teachers in Makassar conducted formative and summative assessments.

In line with the expectations of the Ministry of Education, Culture, Research and Technology which emphasizes that Indonesia now needs an adaptive curriculum. Adaptation according to him prioritizes students' personalities and basic skills in the learning process.

The learning process in the independent study program, especially learning the content of Chemistry subjects. Chemistry is one of the scientific subjects that studies the nature and structure of matter, the changes of matter and accompanying energy, often obtained through experimental results and inference. Chemistry includes two parts, which are chemistry as a product and chemistry as a process (Emda, 2017). The difficulties students face in understanding chemistry are often due to the

complexity and abstraction of the concepts involved. Understanding these abstract concepts requires strong reasoning skills to address problems that cannot be directly observed (Rumape et al., 2024). Therefore, it is necessary to research because learners encounter certain difficulties. Most learners feel satisfied with the chemistry learning process, especially when it involves laboratory practice. This shows that practical aspects and real-life experiences are always viewed positively by learners (Uthami et al., 2023). Besides students, teachers also face many challenges in adjusting to differentiated learning methods and adjusting teaching based on students' personal characteristics and skills (Sari, 2024).

The program also has varying impacts depending on implementation in each school and the expertise of each educator. Therefore, further developments are still needed to complete this program (Rahma & Hindun, 2024). In addition to the impact, changes in the curriculum also change the school management model, which must be managed according to government standards (Ahid et al., 2020).

Several schools in Makassar have implemented the independent learning curriculum since the 2021/2022 academic year. I see that the effectiveness of an independent curriculum is directly related to learning outcomes. The self-paced curriculum is designed to provide flexibility and adapt learning to student needs and interests, which is expected to increase student engagement, motivation and understanding. If the implementation of the independent curriculum is effective, learning outcomes will show an increase in competency achievement and student satisfaction with the learning process. I chose the title of this research because the independent curriculum is the latest education policy implemented in various schools, especially in Makassar. Understanding the effectiveness of its implementation empirically can provide important insights into its impact on learning outcomes, as well as assist in the improvement and development of more effective educational strategies in the future. Therefore, it is necessary to clearly understand the effectiveness of implementing the independent learning curriculum in the chemistry learning process in high schools in the city of Makassar.

2. METHOD

This type of research is descriptive. The research was conducted in the odd semester of the 2023/2024 school year at one of the secondary schools, namely SMAN 9 Makassar, located at 37 Jl Karunrung Raya, Kec. Rappocini, Makassar City, South Sulawesi Province. The subjects of this research were chemistry teachers representing 4 people and grade X.1 students because this class represents the population of grade X

at the school. Class X.1 was collected randomly and has a comparable number of students and characteristics to other classes, so the results of the study in this class can reflect the overall effectiveness of the merdeka curriculum implementation. Class X.1 representing 30 people. Research techniques use tools in the form of questionnaires and tests of learning outcomes. The questionnaire can be seen in table 1. and tests of learning outcomes in table 2.

Table 1. Questionnaire Grid For The Implementation Of The Independent Learning Curriculum

No.	Aspect	Item number		Total
		Positive	Negative	
1.	General understanding	1,2,3		3
2.	Learning planning			
	• Teaching module	• 4,5,6,7	• 8,10	
	• Approaches	• 11,12,13,14, 15,17	• 16	18
	• Learning resources	• 18,19,20,21		
3.	Implementation of learning			
	• Introduction	• 22,23,25,26	• 24	
	• Main points	• 27,28,29,30, 31,32,33,34		17
	• Conclusions	• 35,36,37,38		
4.	Evaluation	39,40,41,42,43, 44,45,46,47,4 8,49,50		12
Number of items				50

Table 2. Learning Outcomes Test Grid

No.	Learning Objectives	Cognitive Level						Total
		C1	C2	C3	C4	C5	C6	
1.	Able to determine the valence electrons of an element correctly.			√				2
2.	Able to explain the basic grouping of elements in the periodic table correctly.		√					3
3.	Able to explain the development of the periodic table of elements to correctly identify their advantages and disadvantages.		√					2
4.	Able to explain the meaning of groups and periods on the periodic table correctly.		√					1
5.				√				4

No.	Learning Objectives	Cognitive Level						Total
		C1	C2	C3	C4	C5	C6	
6.	Able to determine the location of elements in the periodic system of elements based on electron configuration or vice versa correctly. Able to analyze the properties of the periodic system correctly.		√					5
			√					
				√				
					√			
						√		
7.	Able to interpret the electron affinity of an atomic number correctly					√		1
8.	Able to rearrange the electronegativity of atoms between elements						√	1
9.	Able to deduce the location of elements in the periodic system of elements					√		1

Data collection techniques in research, this is done by distributing questionnaires and testing learning outcomes. Questionnaires were distributed to chemistry teachers and learning outcomes tests were distributed to students. The tool used is a questionnaire to know how to apply the independent study program and test the learning results. Determine the effectiveness of applying an independent learning program, expressed through indicators assessing the level of success of learning based on the systematic content of periodic elements. The data analysis techniques used in this study are descriptive statistical analysis. Descriptive statistical analysis is used to describe or provide insight into the data obtained.

3. RESULT AND DISCUSSION

3.1. Result

Research data were obtained from the results of the questionnaire, which was distributed to teachers to know how to apply the independent learning program. Data from the descriptive analysis of the questionnaire on the adoption of an independent learning program are presented in Table 3.

Table 3. Results of Descriptive Statistical Analysis of Questionnaires

Statistics Descriptif	Statistical Value
Number Of Samples	4
The Highest Score	87
Lowest Value	73
Average Value	81,75

Median	82,5
Mode	84,45
Variance	4896,4
Standard Deviation	69,97

Table 3 shows the number of teachers in the sample is four people. Based on the implementation table for the independent learning program, the highest score was 87 and the lowest score was 73, while the average score on the teacher questionnaire was 81.75 with a standard deviation of 69.97. The independent study program application questionnaire can be grouped into five categories which can be seen in table 4.

Table 4. Category Level Percentage

No.	Percentage(%)	Category
1.	81% - 100%	Very good
2.	61% - 80%	Good
3.	41% - 60%	Pretty good
4.	21% - 40%	Not good
5.	0% - 20%	Not very good

The percentage results of the questionnaire categories for implementing the independent learning curriculum can be seen in Figure 1.

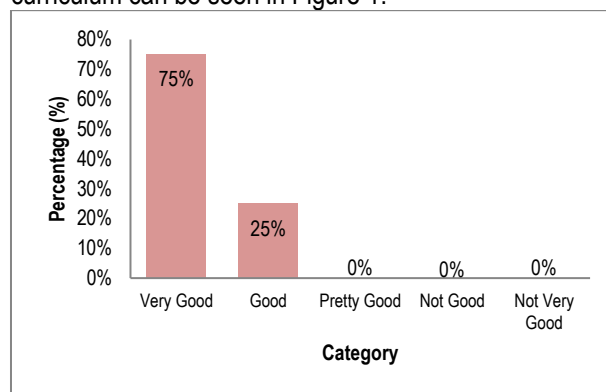


Figure 1. Categories of Questionnaire Implementation of the Merdeka Belajar Curriculum

According to Figure 1, the questionnaire had a very good assortment. This shows that there are 3 teachers who think very well with a rate of 75% and one teacher who thinks well with a rate of 25%. Therefore, it can be concluded that the application of the independent learning program at SMAN 9 Makassar is very well implemented.

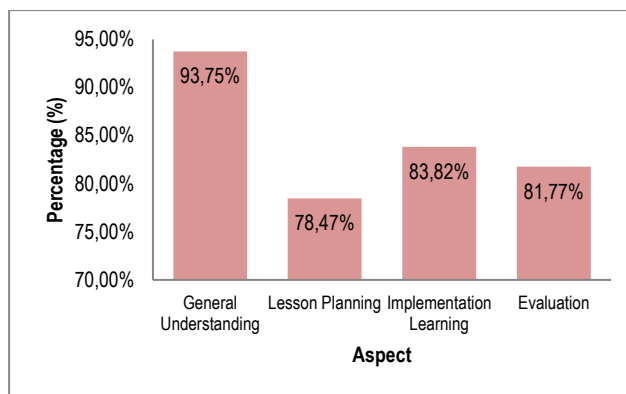


Figure 2. Percentage of Achievement of Each Aspect of the Questionnaire

Based on Figure 2 above, it can be seen that the overall rate of teachers' opinion questionnaires on the application of independent learning programs is at a very good level.

Student learning outcomes on the periodic system of elements material were analyzed using descriptive statistics. Descriptive analysis is one of the statistics used to describe or characterize data. The results of the descriptive analysis of chemistry learning outcomes of students of grade X.1 SMAN 9 Makassar are presented in Table 5.

Table 5. Descriptive Statistics of Achievement of Learner Learning Outcomes

Statistics Descriptif	Statistical Value
Number Of Samples	30
The Highest Score	90
Lowest Value	60
Average Value	78,1
Median	85,7
Mode	78,5
Variance	46884,2
Standard Deviation	216,5

Table 5 presents the sample size of 30 people. In the table, the highest score is 90 while the lowest score is 60, while the average value of student learning outcomes is 78.1 with a standard deviation of 216.5. There are 9 indicators that learners must achieve during the learning process can be seen in Table 6.

Table 6. Student Learning Outcomes for the Completeness of Each Indicator

No.	Indicator	F	%	Categories
1.	Determine the valence electrons of an element.	48	80	Complete
2.	Explain the basis for grouping elements in the periodic table.	75	83,3	Complete

No.	Indicator	F	%	Categories
3.	Explain the development of the periodic table of elements to identify their advantages and disadvantages	44	73,3	Not Complete
4.	Explain the meaning of groups and periods on the periodic table	28	93,3	Complete
5.	Determine the location of an element in the periodic system of elements based on electronic configuration or vice versa	103	85,8	Complete
6.	Analyze the properties of the periodic system	103	68,8	Not Complete
7.	Interpreting the electron affinity of an atomic number	19	63,3	Not Complete
8.	Reorder the electronegativity of atoms between elements	18	60	Not Complete
9.	Concludes the location of elements in the periodic system of elements	30	100	Complete
Total			80,1%	

Based on Table 6, it can be seen that completeness of student learning outcomes on the material periodic system of elements has a high indicator completeness with a total of 80,1%. The criteria for indicator mastery in this study refer to class mastery. Class mastery is considered achieved when one of the learning indicators reaches or exceeds the class mastery standard. Conversely, if the indicator mastery does not reach the class mastery standard, it is declared not mastered. It shows that of the nine indicators of competency achievement, five indicators are complete and four indicators are not complete. Indicators that are classified as complete if they reach $\geq 75\%$ in accordance with the criteria for chemistry learning outcomes of class X.1 SMAN 9 Makassar.

3.2. Discussion

This study was conducted at SMAN 9 Makassar in Jl Karunrung Raya No. 37, Karunrung, Kec. Rappocini, Makassar province. South Sulawesi. This study aims to find out how to implement an independent learning program at SMAN 9 Makassar with the research topic of teachers and students of grade X SMAN 9 Makassar in Chemistry. This study was conducted by surveying

teachers on the implementation of an independent learning program with a total of 50 questions and examining student learning outcomes on the periodic system of elements content up to 20 question.

Based on Figure 2, it can be seen that the survey results on the general understanding aspect with an achievement percentage of 93.75%, can be concluded that the Merdeka Curriculum is very effective in increasing the general understanding of teachers or students. This shows that the majority of respondents have a very good understanding of the concepts, principles and objectives of the Independent Curriculum, thus enabling them to apply the curriculum optimally in the learning process.

In the learning planning aspect, the achievement percentage of 78.47% is in the good category, which shows that the majority of teachers are able to plan learning according to the demands of the Independent Curriculum. Although these results are quite good, there is still room for improvement to ensure planning can better support the educational goals envisioned by this curriculum.

The learning implementation aspect recorded an achievement percentage of 83.82% which was included in the very good category. This shows that in its implementation the implementation of learning according to the Independent Curriculum can be implemented very effectively. Teachers are able to implement a dynamic learning process that is relevant to students' needs, although there is still room for further development.

In the evaluation aspect, the achievement percentage of 81.77% is also in the very good category, this shows that the evaluation process in the Merdeka Curriculum is effective. Teachers are able to carry out comprehensive evaluations in accordance with curriculum principles, but ongoing efforts are still needed to ensure these evaluations remain relevant and have a positive impact on student learning outcomes.

The questionnaire results show that 75% of respondents rated the implementation as very good and 25% rated it as good across various aspects of the independent learning program. Therefore, the implementation of the independent learning program, based on the teachers' feedback in class X.1 at SMAN 9 Makassar, can be considered to have been carried out well.

Based on research conducted by (Monika et al., 2023) Regarding effectiveness, research results show that the effectiveness of applying an independent learning program can be achieved by conducting end-of-term student assessments using 4 indicators: quality, completeness, intensity, and effectiveness. degree and time. To achieve the result of learning using an

independent study program, its application is considered very effective.

Further research was conducted by (Qurniawati, 2023) on the effectiveness of the implementation of the self-directed learning curriculum. The research shows that the current independent learning curriculum has been implemented optimally and sustainably, but its implementation requires coordination from various aspects of teachers, supporting facilities and infrastructure, and the students themselves. Curriculum can also improve achievement students' learning, as evidenced by the increase in academic achievement compared to previous years.

Furthermore, research conducted by (Mawardani, 2023) regarding the implementation of an independent curriculum in history classes at SMA Negeri 5 Bandar Lampung in the 2022/2023 school year revealed that teachers Subject. History at SMA Negeri 5 Bandar Lampung Demonstrate implementasi curriculum. The 2022/2023 learning curriculum will be more independent. This requires teachers to implement rancor learning which is includes learning outcomes (CPs), goal development learning (TP), grooves Destination learning (ATP), and implementing education modules prepared in accordance with Ministerial Decree No. 262/M/2022. In the implementation of learning, teachers have implemented learning differentiation based on process and product, but teachers still have difficulty implementing learning differentiation based on process. In addition, even though teachers have introduced summative and formative assessments in the assessment they still find it difficult to organize time to conduct assessments effectively. Teacher implementation SMA Negeri 5 Bandar Lampung has been implemented, but not completed.

Similar research was conducted by (Azizah., 2023) on the effectiveness of the implementation of an independent learning curriculum in first grade Indonesian language learning at Al Ghaffar Mulyoagung Islamic Elementary School, Malang Province. The results of the study revealed that Language Indonesia learned through the participants' independent curriculum at Al Ghafar Islamic Primary School. Students will be able to understand the material presented by the researcher and read and write words fluently while learning Indonesian.

Similar research was also conducted by (Samsuddin, 2023) on the implementation of an independent study program at SMA Negeri 1 Tanjung Jabung Timur. The results show that the implementation of the independent learning program at SMA Negeri 1 Tanjung Jabung Timur is good. This is evident by considering all samples as "very good", which means that

the implementation of the independent learning program has been successful.

Similar research was also conducted by (Yunita et al., 2023) regarding the implementation of the independent learning curriculum at the Jami'atul Qurro' Islamic Boarding School in Palembang. The results showed that the implementation of the independent learning curriculum had been carried out through process coaching, guidance technical, training, learning, by integrating tolerance material into subjects.

Descriptive analysis results in Table 5 In addition, the standard deviation value obtained is 216,5. If the standard deviation value obtained is large, it indicates that the deviation of the value from the average is large, so the data is increasingly spread (varied) from the average. This means that the deviation of the data is less.

Descriptive analysis presented in Table 6 also shows individual completeness, and there are nine indicators of competency achievement. Data analysis showed that only four indicators were incomplete: Indicator 3, Indicator 6, Indicator 7, and Indicator 8. This is because students have difficulty solving problems and students are unable to provide information processing. If all the elements that underlie the teaching and learning process run as a whole and students are satisfied, satisfied with the learning process, satisfied and satisfied with the learning outcomes, then the teaching and learning process can be said to be good in that the learning outcomes carry a deep impression, adequate facilities and infrastructure, selection of appropriate teaching methods and materials, professional teachers (Mulyasa, 2004).

Even though the independent program curriculum is considered good by teachers, there are phenomena that show student learning outcomes do not always meet expectations. This can be caused by several factors. First, although the independent curriculum gives teachers the freedom to develop teaching materials and methods, not all teachers have sufficient skills or resources to make optimal use of them. As a result, the designed learning becomes less effective for students. Second, this curriculum requires students to be more independent in learning, this can be a challenge for students who are not used to a more active and independent learning approach. This can result in decreased motivation and difficulty in understanding the material, thereby affecting their learning outcomes. Finally, a mismatch between teacher expectations and students' readiness for change may also be a factor in differences in outcomes. So the results of the descriptive analysis show that student learning outcomes based on the KKM for implementing the independent learning curriculum in class X.1 at SMAN 9 Makassar are

effectively used to improve student learning outcomes. This is proven by the learning outcomes of students who complete more than those who do not. The improvement in student learning outcomes is reflected in their responsiveness in actively solving problems related to the subject matter, thinking critically, creatively, and independently when answering questions (Murtihapsari et al., 2022).

4. CONCLUSION.

The implementation of the autonomous learning program in the chemistry learning process in class X. 1 SMAN 9 Makassar is very well done. This is clearly shown through the questionnaire for chemistry teachers with an average score of 81.75 at a very good level, proving that the application of the self-study program has been well implemented. The effectiveness of implementing an independent teaching program in the process of studying Chemistry in grade X. 1 SMAN 9 Makassar achieved effectiveness with an average score of 78.1. This is shown by the value of the learning outcomes of students who have completed their studies more than those of students who have not completed.

Although this study provides valuable information about the implementation of an independent learning program, several limitations need to be addressed. First, this study only included one class with a limited number of students (30 students) and 4 chemistry teachers, so the results may not be generalizable to all classes or other schools. Second, the data collection methods used relied heavily on questionnaires and post-tests, which did not necessarily reflect all aspects of program implementation and effectiveness.

For future research, it is recommended to expand the sample size by including more classrooms and schools to obtain a more complete picture of independent learning program implementation. Additionally, data collection methods could be improved by using direct observations and in-depth interviews to better understand the experiences and perspectives of teachers and students. Further research could also explore other factors that may influence program effectiveness, such as academic support, parent involvement, and educational infrastructure.

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