

## DEVELOPMENT OF TEACHING MATERIALS TO SUPPORT MERDEKA CURRICULUM LEARNING ON PERIODIC SYSTEM MATERIALS FOR PHASE E

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**Abstract:** This research on the development of teaching materials aims to develop teaching materials to support Merdeka Curriculum learning on the material of the periodic system of elements of Phase E to determine the validity of teaching materials to support Merdeka curriculum learning on the material of the periodic system of elements of Phase E based on the feasibility aspects of content, presentation, components linguistics, as well as graphical components, and knowing the user's response to teaching material products to support merdeka curriculum learning on periodic system elements of Phase E. The plump development model was used in this research procedure with the educational design research (EDR) research type. However, the research only reached the practicality stage. The development results show that the teaching materials are feasible to use correctly, with an expert assessment of the feasibility of teaching materials of 0.90. For user responses, teaching materials can be appropriately used, with a score of (93.7% teachers and 91.7% students).

**Keywords:** *Teaching Materials, Merdeka Curriculum, Periodic System of Phase E Elements*

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### INTRODUCTION

Education is the curriculum implementation in the form of a learning process that can develop the quality of individuals in achieving the standard of national education goals. The goal of national education can be seen in the quality of graduates [1]. According to Fani & Mawardi [2], the covid-19 pandemic has impacted education. Not only that, changes in the order of human life, such as education, began in November 2019 [3]. As a result, learning activities will not run smoothly and optimally [4]. These changes cause learning to be less efficient, so learning loss occurs [5]. Muzdalifa [6] explains that learning loss is when learners lose knowledge and skills knowledge and skills in general or specifically experience academic setbacks and gaps in the education process. The impact of learning loss requires curriculum improvements by policymakers to adjust the existing conditions. These improvements began with the revision of the 2013 curriculum, which was simplified to the adjustment of the prototype curriculum, now called *the Merdeka* curriculum.

The *Merdeka* curriculum is a curriculum that can be implemented in education units starting in the academic year 2022/2023. The purpose of establishing *the Merdeka* curriculum is to improve more active and adaptive learning by giving freedom to educators in the learning process. The curriculum is regulated in the Decree of the Minister of Education and Culture Ristek No. 56/M/2022 concerning guidelines for implementing the curriculum in restoring learning. The *Merdeka* curriculum has been tested by being implemented in schools and vocational high school centers of excellence. A driving school focuses on developing learning outcomes and holistically by realizing the Pancasila profile, which includes competencies and characters

that start with the excellent human resources of the school principal. The profile is a description of graduates who can show personality and competence following the values of Pancasila [7]. Curriculum *Merdeka* curriculum is a curriculum designed to improve the 2013 curriculum. Adjustments curriculum is one of the implementations of adaptation of learning with the development of times to obtain a good learning process. Ministry of Education [8] states a good learning process requires teaching materials. Teaching materials are needed in line with the Era of Industrial Revolution 4.0 [9]. Where at this time, it prioritizes technological interconnection activities [10].

Teaching materials refer to all types of materials consisting of an organized set to assist the teacher in learning activities. Students also use them to obtain information [8]. One of the forms of teaching materials that are easiest to use is teaching material in printed form [11]. According to Sulkipani et al. [12], Teaching materials are one of the means to the success of the learning process to achieve learning objectives [13]. Compiling material teaching materials contains discussions and evaluations that users can understand. Teaching materials include more than just reading materials but activity sheets [14]. Reading material also consists of a student activity sheet. Therefore, teaching materials are one of the most important learning resources in the learning process. Important in the learning process. Also, teaching materials for students to master knowledge to increase student involvement in the chemistry learning process [15]. However, in implementing *the Merdeka* curriculum, various

obstacles, including textbook teaching materials, need to be completed [16].

Based on interviews that have been conducted with teachers of Senior High School 3 Padang, senior high school 8 Padang, and Senior High School Pembangunan Laboratorium UNP show that teachers use the Kemendikbud package book and learner worksheet in the learning process phase E. However, the textbook used in learning chemistry phase E phase chemistry learning contains incomplete material content, coherent and insufficient to help students understand learners, especially on the system material due to incomplete material content. Based on the results of the interview, teaching materials are needed that contain complete, coherent material that is complete, coherent and is expected to can help students' understanding of learning.

One of the solutions to this problem is developing teaching materials that can meet the needs of students in understanding the material of the periodic system of elements. Besides, it can also help reconstruct students' knowledge so they can master learning concepts very well. The development of teaching materials is expected to assist teachers in delivering learning materials, helping students get the concept of material at school. It is expected to support students in learning the periodic system of elements. As for the teaching materials developed, a multi-representation of chemistry is given to express chemical ideas so that students understand chemistry [17].

The material of the periodic system of elements contains many new terms and vocabulary, being the subject of discussion of groups, periods, characteristics, and periodic system of elements such as atomic radius, ionization energy, electronegativity, electron affinity, and physical and chemical properties of elements. Electrons are as well as the physical and chemical properties of elements. The element periodic system material is the most important periodic system of elements. It is the most fundamental material in chemistry, so students learners must master carefully so that the following chemistry material does not experience difficulties [18]. In the *Merdeka* curriculum textbook, the material content has yet to be systematized according to the chemical hierarchy chemistry, especially on the material of the periodic system elements, such as incomplete material content. It is not enough to help students understand students in the learning process, and reinforced by the existence of this research has yet to be done by other researchers, so this research is necessary because the research results can be used for teaching materials later.

Development of teaching materials in the form of *Merdeka* curriculum material content on learning chemistry material periodic system of elements phase E has never been done by other researchers, so research on the development of teaching materials periodic system of phase E elements is a necessary

effort to support learning *merdeka* curriculum, besides that, the development of teaching materials to motivate and increase interest in learning students [19].

Based on the background above, the author researched the development of teaching materials to support the *Merdeka* curriculum, which aims to help students understand the material of the periodic system of elements as a whole. This research is entitled "Development of Teaching Materials to Support Learning *Merdeka* Curriculum on Element Periodic System Material Periodic System of Elements for Phase E." This research aims to develop teaching materials to support learning *the Merdeka* curriculum on periodic system material Phase E elements.

## RESEARCH METHODS

The type of research conducted is educational development research or Educational Design Research (EDR) using the Plomp model as the development model. The Plomp model becomes a guideline for implementation in this study with stages: (1) preliminary research and (2) assessment phase [20]. The subjects of this research were three chemistry lecturers of FMIPA UNP, two chemistry teachers of senior high school 8 Padang, and nine students of Phase E of Senior High School 8 Padang in the 2022/2023 school year. The object of this research is teaching materials to support independent curriculum learning on the material of the periodic system of elements of Phase E.

The development of teaching materials to support independent curriculum learning on the material of the periodic system of elements in Phase E is developed using the Plomp model with stages, namely Preliminary Research, Prototyping, and Experimental and Evaluation stages [21].

The instruments used were validation and practicality instruments. The validation instrument is used to evaluate the content and construct validity. The data obtained will be used to show the validity of the teaching material development design to support independent curriculum learning. The material of the periodic system of phase E elements and the practicality instrument helps realize the practicality of implementing independent curriculum learning through teaching materials during the teaching and learning process.

The data obtained from the research results were processed using Aiken'S V formula formulated in Equation 1.

Equation 1. Aiken'V formula

$$V = \frac{\sum s}{n(c-1)}$$

Description:

S = The validator's chosen score minus the lowest score in the category used (s= r-

$I_o$ ), where  $r$  is the score in the validator's chosen category, and  $I_o$  is the lowest score in the scoring category.  
 $n$  = number of validators  
 $c$  = number of categories selected by the validator

The level of validity of teaching materials to support independent curriculum learning on the material of the periodic system of Phase E elements will be seen after being converted to the categories in Table 1.

Table 1. Aiken's V Scale Categories

Aiken's Scale	Validity
$V < 0.8$	Invalid
$V > 0.8$	Valid

Source: [22]

The practicality sheet was made from the learner response questionnaire, which was analyzed using the following formula.

$$NP = \frac{R}{SM} \times 100$$

Description:

- NP : Calculated percent value
- R : Score obtained from students
- SM : Maximum score

The level of practicality of teaching materials to support independent curriculum learning will be seen after being converted to categories such as Table 2.

Table 2: Practicality Category Table

Score	Practicality
86% - 100%	Very practical
76% - 85%	Moderately practical
60% - 59%	Practical
55% - 59%	Less practical
$\leq 54\%$	Not practical

Source: [23]

## RESULTS AND DISCUSSION

### Preliminary Research Stage

Needs and context analysis, literature review, and conceptual framework development were some steps taken at the preliminary research stage. This method is used to identify educational problems and their solutions. This method includes:

#### Needs and context analysis

At this stage, interviews were conducted with teachers in three senior high schools: SMA Negeri 3 Padang, Senior High School 8 Padang, and Senior High School Pembangunan UNP. The results show that teachers in the learning process of the independent curriculum have little difficulty in finding teaching materials as learning resources in the form of material

content due to the incomplete content of the material in the Ministry of Education and Culture package books and the limited availability of teaching materials due to the new independent curriculum and supported by the opinion of Iryanto who stated that teaching materials in the form of textbooks in the independent curriculum were incomplete [16].

After conducting a needs analysis, a context analysis was conducted. This analysis identifies, details, and systematically arranges the scope of material, learning objectives, and strategies chosen. The material selected in this development is the periodic system of elements. Analysis can be done on the independent curriculum's learning outcomes of Phase E. Analyze the learning outcomes that have been carried out so that the learning objectives of the periodic system of Phase E elements are obtained.

### Literature study

This stage is carried out by finding and understanding information from sources / references to books, articles, journals on how to solve the problems faced. From the literature study that has been carried out, It is known that the problem at this time is that the curriculum changes to adapt to the existing conditions, namely the independent curriculum where the independent curriculum is a curriculum that expects active and adaptive learning by giving educators the freedom to carry out learning but the teaching materials used are incomplete a solution is obtained that it is necessary to develop teaching materials to support independent curriculum learning, especially on the material of the periodic system of Phase E elements [24].

### Conceptual Framework

At this stage, a framework for research is carried out by identifying problems and finding solutions to the learning difficulties, namely the need for complete teaching materials in the form of content on the independent curriculum.

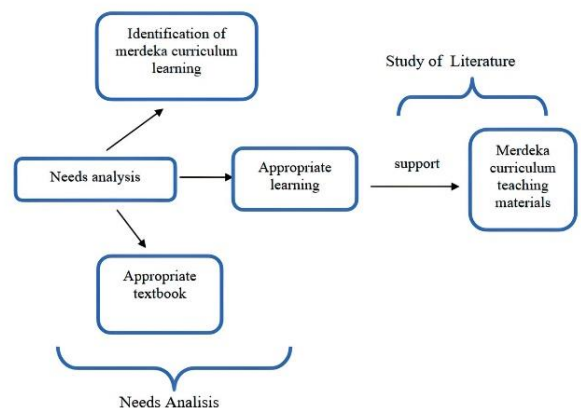


Figure 1. Conceptual framework

### Prototyping Stage Prototype I

At this stage, researchers develop teaching materials to support independent learning on the material of the periodic system of elements. The initial design of teaching materials was carried out by making the appearance of conventional teaching materials with a more attractive appearance and content so that students were interested in reading and learning the contents of the teaching materials. The display of content in teaching materials can be seen in Figure 1.



Figure 2. The cover contained in teaching materials



Figure 3. Examples of activities contained in teaching materials

Figure 2 shows that the cover of the teaching material is designed as attractive as possible so that students are interested in reading the material content available in the teaching material. Also, in the teaching materials, some activities contain questions to increase students' understanding of the material presented, as seen in Figure 3.

At this stage, students work on practice questions contained in activities that are carried out independently or in groups with the aim that after studying the material, students can understand the material properly and maturely.

### Prototype II

The results of the prototype I that have been developed are then evaluated (formative evaluation) through self-evaluation. The instrument used is a checklist. The aim is to determine the completeness of the design components developed previously.

### Prototype III

The prototyping stage of this research is limited to practicality only. Because for this research to be more focused and directed, the limitations of the study to be discussed are research on the development of teaching materials to support independent curriculum learning on the material of the periodic system of elements in phase E using the Plomp development design model which is carried out up to the validity and practicality test stages. Five validators evaluated teaching materials to validate the content. The content validity test was conducted to determine content, language, and graphics feasibility.

Overall, based on the results of 5 validators' assessment of the product, the selection of 5 experts is based on Sugiyono's opinion which states that to test the validity of the instrument, the opinion of experts can be used, the number of which is at least three people [25] the average value of the Aikens V index is 0.90. Based on table 2, content validation is included in the valid category. Thus, the teaching materials developed can be declared content valid.

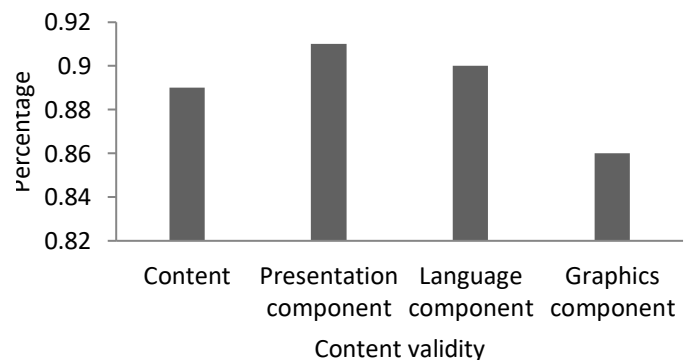


Figure 4. Validation Result

**Prototype IV**

The development product declared valid is then evaluated in a small group evaluation. The samples used in this evaluation were nine students of phase E of SMAN 8 Padang and two chemistry teachers. SMAN 8 Padang and two chemistry teachers. The results of student and teacher practicality analysis are shown in Figure 6.

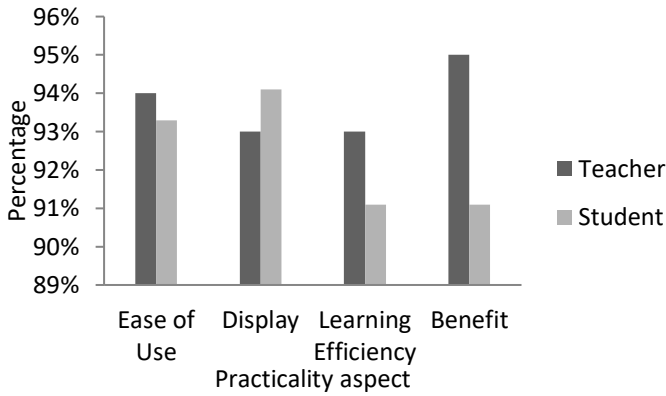


Figure 5. Small Group Result

Based on Figure 5, the average percentage value of the small group practicality test on students is 91.7%. While the average percentage value of the small group practicality test on teachers is 93.7%. Based on Table 2, the practicality of chemistry students and teachers is included in the very practical category.

The results of the student and teacher practicality tests illustrate that the presentation of the material used is easy to understand. The content of the material provided is easy for students to understand. The practice questions can lead students to understand the material of the periodic system of elements of Phase E. Thus, the teaching materials developed are declared practical.

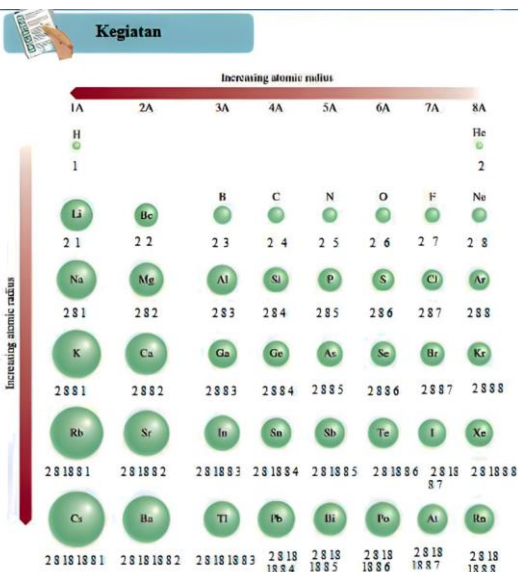


Figure 6. Activity questions in teaching materials

Students must answer one of the activity questions contained in the developed teaching materials, as seen in Figure 6, where students are relied upon to answer how the tendency of the atomic radius in one period according to the picture given. From interviews conducted with students, it is known that in one period, the radius is getting more significant due to the increase in the number of skins in an element. Based on the answers given by students, the images in the teaching materials can help students answer questions correctly. The submicroscopic level can help students answer questions in teaching materials. if given submicroscopic without macroscopic, students answer less precisely.

Without us realizing it, it turns out that the event or phenomenon of rust is often encountered in everyday life. For example, the rusting that occurs on iron is one of the chemical changes that can be seen in the picture above. It is a renewal of the independent curriculum where the content of chemistry material is related to everyday life and can be applied.

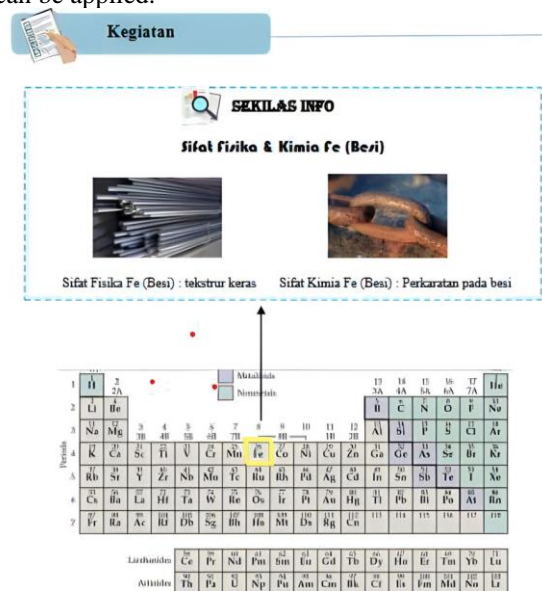


Figure 7. Activities in teaching materials

**CONCLUSION**

Based on the results of research conducted on teaching materials on the material of the periodic system of elements, it can be concluded that: Teaching materials to support an independent curriculum on the material of the periodic system of elements phase E SMA/MA can be developed with the Plomp development model and teaching materials to support an independent curriculum on the material of the periodic system of elements phase E in Senior High School developed has a V value of 0.90 with a valid category.

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