



Development of Textbooks to Support Merdeka Curriculum Learning on Basic Laws of Chemistry Materials around Us

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Abstract

The objective of this research is to create educational materials for the Merdeka curriculum that focus on fundamental chemical principles. The study adopts the Educational Design Research (EDR) approach, utilizing the Plomp development model consisting of three stages: initial investigation, development, and prototype formation. To gather data, validity questionnaires and practicality questionnaires were employed. The developed textbooks underwent validation by five individuals, including three chemistry lecturers from FMIPA UNP and two chemistry teachers from SMAN 8 Padang. Additionally, practicality testing involved nine high school students from Phase E and two chemistry teachers from SMAN 8 Padang. The data analysis employed a Likert scale, employing Aiken's V formula to assess textbook validity and the modified Purwanto formula to assess practicality. The analysis of the data revealed that the product validation by the five validators yielded an average score of 0.86 indicating the textbooks' validity. Furthermore, the practicality evaluation by students and chemistry teachers yielded an average score of 92% and 95% respectively, indicating a high level of practicality. This research has a difference with previous research, namely that each of the basic laws has examples of application in everyday life. In conclusion, based on the data analysis, it can be inferred that the developed textbooks on the basic chemical laws are both valid and practical for use in chemistry education.

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INTRODUCTION

Textbooks are a very important component in supporting the learning process. The use of textbooks in schools to support learning, especially in chemistry learning (Mawarnis et al., 2023). Textbooks contain learning materials that are arranged systematically which are used by educators and students in the learning process (Sukerni, 2014 & Devirita et al., 2021). One of the textbooks that are suitable for school is textbooks. Textbooks assist educators in carrying out teaching and learning activities in class, which also enable students to be able to study independently according to the applicable curriculum (Nuryasana & Desiningrum, 2020). Textbooks must be in accordance with current curriculum developments so that they can support chemistry lessons.

The Merdeka Curriculum textbook is a book compiled based on Learning Outcomes with a profile of Pancasila students as the target (Rahimah, 2022). A Pancasila student profile so that students have a soul in accordance with the values contained in the Pancasila precepts. The Merdeka curriculum textbook prioritizes character development through content in learning (Ministry of Education and Culture, 2020). The Pancasila student profile consists of 6

elements of the composing character, namely piety to God almighty and noble, global diversity, mutual cooperation, independence, critical and creative reasoning (Juliani & Bastian, 2021). The Merdeka Curriculum textbook is implemented in a limited way in the SMA/MA Independent Curriculum.

The use of textbooks can help students learn independently, in textbooks containing complete material units. Factors of interest and motivation as well as intelligence are some of the psychological factors of students that have a significant influence on their learning success (Djamara, 2008). Therefore, interest and motivation in reading textbook material is needed to support the implementation of the learning process. Santosa (2008) found that picture books can increase students' motivation and interest in reading.

One of the materials on chemistry learning in the Independent curriculum is the basic laws of chemistry. The basic laws of chemistry are the most basic learning topics in chemistry. Chemistry, this topic can support the understanding of other more complex chemical topics such as stoichiometry (Fajriani et al., 2019). Topics such as stoichiometry (Fajriani et al., 2019). Basic law of chemistry material contains the concepts of the basic laws of chemistry. The basic laws of chemistry include the law of conservation of mass, the law of permanent comparison, the law of multiple comparisons, Gay Lussac's law of volume comparison, and Avogadro's law and their applications in everyday life. Application in everyday life are some of the topics discussed in the material on the basic laws of chemistry. in the material about the basic laws of chemistry. (Rosidah et al., 2014).

The chemical law material around us is based on an independent curriculum carried out through classroom learning. Independent curriculum requires students to be active in the learning process and student-centered (Fani, V & Mawardi, M., 2022). However, the current learning is not entirely student-centered as the curriculum demands (Mawardi et al., 2018). The learning process generally students work on assignments first and during class hours students can discuss and the teacher acts as a facilitator and mediator so that the learning process can be student-centered (Herpika, F & Mawardi, M., 2021).

The problems that occur in the field show that textbooks in schools are still not in accordance with the expected conditions. This is known from the results of an initial study conducted in three schools, namely Padang 1 High School, Padang 8 High School and UNP Development High School. Problems related to the use of textbooks based on interviews conducted at schools found that some information regarding the independent curriculum books available for Phase E was still limited. This result is reinforced by Angga et al., 2022 which states that the textbooks in the Merdeka curriculum are still incomplete for carrying out learning. Teachers in schools in the learning process still use the teacher-centered lecture method which is not in accordance with the demands of an independent curriculum which should be student-centered learning. Existing textbooks contain too much writing and do not yet have illustrated pictures to better understand the material. Textbooks display illustrations or black and white images and the use of language that is difficult for students to understand, so innovative textbooks are needed that contain illustrations or pictures (Fitriya, 2018). Image illustrations can explain abstract concepts in chemistry. In addition, concepts in chemistry also require simple activities to understand (Mawardi et al., 2018).

The use of textbooks can overcome this problem. Several researchers have examined chemistry textbooks. Basic Chemical Law Electronic Book by Dika, Tri, A & Muammar, Yulian. (2018) and by Wilda, S., Muhaimin, & Devi, T., (2016) state that the textbooks developed are valid and practical for use in chemistry learning. The use of textbooks can help students learn independently, in textbooks containing complete material units. Factors of interest and motivation as well as intelligence are some of the psychological factors of students that have a significant influence on their learning success (Djamara, 2008). Santosa

(2008) found that picture books can increase students' interest in reading. In the teaching and learning process the teacher has not fully provided content directly and related it to the real situation of students.

This study has three differences with previous studies. The first difference is that the textbooks used are printed textbooks. The difference between the two textbooks is that they integrate concrete examples of the basic laws of chemistry. The third difference, where research is aimed at phase E students at SMAN 8 Padang. This research has novelty from previous research. The first renewal lies in textbooks that are developed according to an independent curriculum. The second novelty, the developed textbook has applications in everyday life in every basic law of chemistry. The third novelty is a textbook made by applying real examples of basic chemical laws that can increase students' understanding.

Textbooks circulating in the community are still not colored or black and white and do not have examples of application in everyday life. In accordance with the opinion of Fitriya, (2018) which states that textbooks in circulation still display a lot of illustrations or black and white images and the use of language is difficult for students to understand. Meanwhile, this book already has multirepresentations and interesting pictures. This textbook is made using contextual learning methods that emphasize the process of student involvement to find material and connect it to real life situations (Sanjaya, 2019). In accordance with the opinion of Elaine B. Johnson who states that contextual learning is an educational process to help students see the meaning in the lessons they learn. The material in this textbook has examples of application in everyday life that can make it easier for students to understand the material. This textbook is also in accordance with the mardeka curriculum because it is prepared based on the learning outcomes of SMA / MA stage E.

Textbooks publications related to certain fields of study that are used as a reference for students at a certain level as learning materials (instructional). As per the Minister of National Education's Regulation No. 11 of 2005, textbooks are considered essential reference materials for schools. They encompass educational content aimed at fostering character development, nurturing personal traits, enhancing scientific and technological proficiency, and promoting physical and health well-being. This material is prepared based on national education standards (Devirita et al., 2021). Therefore, a textbook is a collection of subject matter that contains curriculum content that must be mastered by students through learning activities and arranged systematically to foster a learning atmosphere. So it is necessary to develop textbooks so that students are active in the learning process at school (Mawardi et al., 2022). Based on the explanation above, it is necessary to develop a chemistry textbook to support independent curriculum learning of basic chemical laws around us. This study aims to determine the results of the validity test and determine the results of the practicality test of using textbooks to support independent curriculum learning of basic chemical laws around us for stage E SMA/MA.

METHOD

This particular research falls under the category of educational development research, also known as educational design research (EDR). The study followed the plomp model, originally proposed by Tjeerd Plomp, which comprises three distinct stages: initial investigation, development or prototype formation, and the assessment stage (Plomp, 2013). The development procedure carried out by researchers based on the plomp model can be seen in Figure 1.

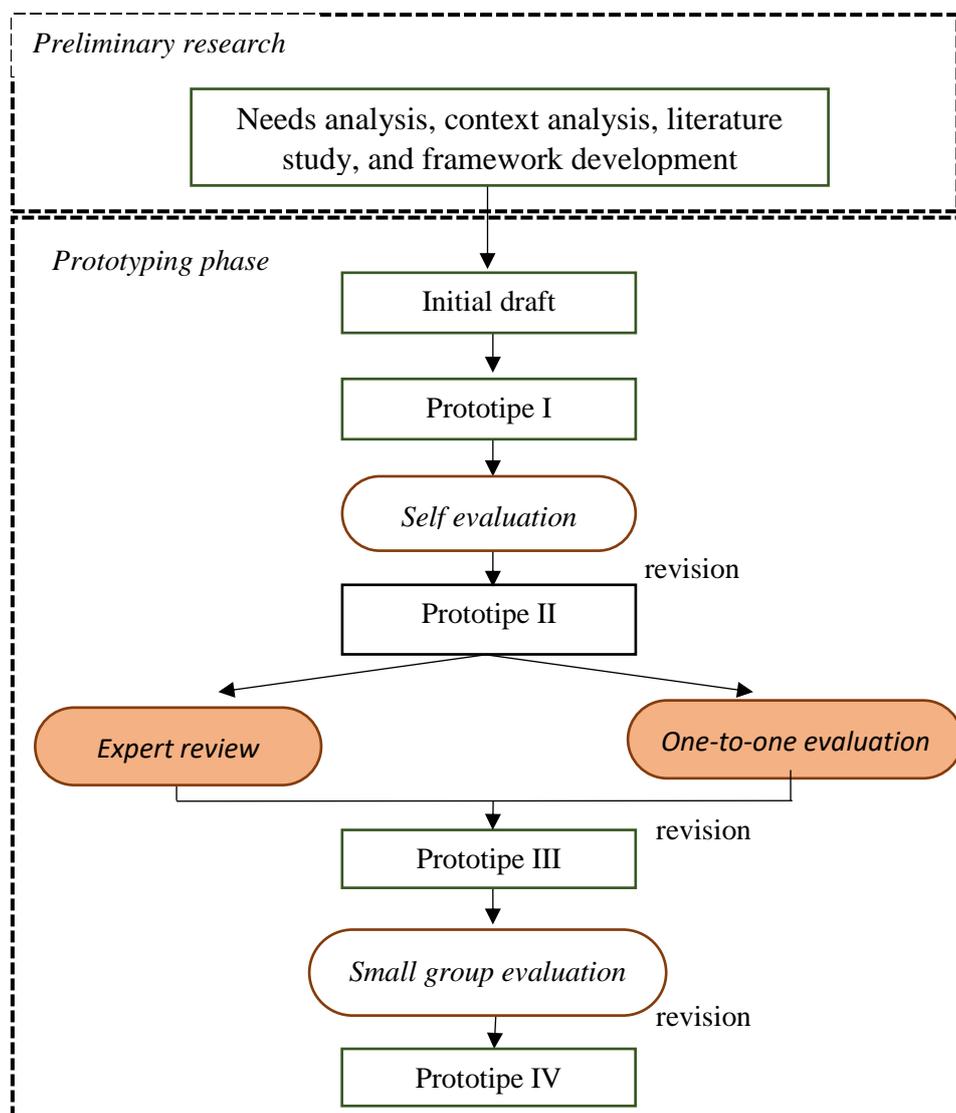


Figure 1. Research Design

During the initial stage, the research commenced with an investigation that involved analyzing needs and context, conducting a literature review, and developing a conceptual and theoretical framework for the study. The second stage, making a textbook design prototype which includes: formulating learning objectives, designing textbooks, and compiling research instruments and the resulting design realization. The results of this design realization are referred to as prototype 1.

In prototype 1 then self-evaluation was carried out. This evaluation aims to see the completeness of the contents and specifications of the textbook design (prototype 1). If there are still deficiencies, then a revision is made to prototype 1. The textbook that has been revised from the self-evaluation is called prototype 2. The resulting prototype 2 is validated. validation was carried out by consulting prototype 2 with 5 validators, namely 3 lecturers majoring in chemistry at FMIPA UNP and 2 high school chemistry teachers.

On prototype 2 a one-to-one evaluation was also carried out. This evaluation aims to gather input regarding the product being developed through interviews with 3 students with different intellectual levels. The research subjects for this one-on-one evaluation were SMA 3 phase E students. Based on suggestions and input from the validator and one-on-one evaluation, prototype 2 was revised. The results of the revised prototype 2 are referred to as valid prototype 3. In the resulting prototype 3, trials were carried out in small groups. This trial

aims to see student responses to textbooks through practical worksheets. This trial was conducted on 9 students. Prototype 3 revision will produce valid and practical prototype 4.

The validity analysis utilizes the Aiken's V formula, which is derived from the modified Boslaugh category assessment and is employed in the validity analysis process. The validators are provided with a questionnaire to assess various aspects based on specific criteria, and they are given the opportunity to provide feedback on the evaluation. The average validation score for each criterion is calculated using the formula :

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

Description: S = The lowest score in the category used and determined by the validator

Io = Assessment category for the lowest score

n = Number of validators

c = Number of categories set by the validator

Table 1. Criteria for the Validity of Basic Laws of Chemistry Textbooks

Scale	Validity
$V < 0,8$	Invalid
$V \geq 0,8$	Valid

Aiken (1985).

The practicality analysis technique, namely the student response questionnaire provided for the assessment of the practicality sheet, is analyzed using a formula modified by Purwanto.

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

Description: NP = Percentage value sought and desired

R = Obtained basic grades from students

SM = Maximum achievable reference test score

100 = Fixed number

Table 2. Practicality Level Converted to Practicality of Independent Curriculum-Based Textbooks

Mark	Practicality
86% - 100%	Very practical
76% - 85%	Practical
60% - 75%	Practical enough
55% - 59%	Less practical
$\leq 54\%$	Not practical

(Purwanto 2010).

RESULTS AND DISCUSSION

Initial Investigation Stage

Needs analysis

The purpose of the needs analysis is to identify issues pertaining to the curriculum requirements for school-based learning. In the Mardeka curriculum, the emphasis is placed on fostering active student engagement. Students are expected to actively participate and be self-reliant in their learning, while teachers play the role of facilitators and motivators. Through interviews with chemistry teachers from SMAN 1 Padang, SMA 8 Padang, and SMA Pembangunan UNP, it was revealed that the teachers utilize curriculum textbooks from the

Ministry of Education and Culture and Erlangga publications. However, these existing Ministry of Education and Culture textbooks predominantly consist of text, lack illustrations or visual aids, and fail to provide innovative learning resources that are easily comprehensible to readers. Consequently, there is a need for additional learning materials that can enhance students' understanding of the subject matter within the independent curriculum. The teachers also expressed their concerns about the limited availability of chemistry textbooks specifically designed for the independent curriculum. The results of the interviews in the three schools can be seen in the pictures in Figure 2.

TEACHER INTERVIEW SHEET

Teacher Name : Eka sovia, MPd
 School name : SMAN 1 Padang
 Subjects : Chemistry
 Teaching Class : X / Phase E

1. What curriculum do you use at school?
= independent curriculum
2. Is learning at your school still centered on the teacher?
= generally student-centered
3. In your opinion, what is an independent curriculum?
= curriculum that frees students to innovate and according to their interests and talents and there are intracurriculars and extracurriculars
4. What makes the independent learning curriculum different from the 2013 curriculum that you feel?
= curriculum 2013 RPP into teaching modules, aspects of schematic and formative assessment. KD independent curriculum is a learning goal and there is a project
5. Do you understand the application of the independent curriculum in chemistry learning?
= already understand enough, because the teacher received training several times on the independent curriculum
6. Do you use teaching materials in every Chemistry lesson?
= yes, using teaching materials
7. What types of teaching materials do you use in learning Chemistry in the Independent Curriculum?
= module, RPP, LKPD
8. What textbooks do you use in the learning process? (Erlangga book/book of the Ministry of Education and Culture)
= Ministry of Education and Culture's integrated science book (Unggul Sudarmo)
9. Are the textbooks that you use sufficient to increase students' understanding of the material according to the independent curriculum?
= not enough, of course students need a lot of books because they have to adjust to the independent curriculum
10. Is the basic law of chemistry material considered difficult by students? If so, according to you, what caused these students to find this material difficult?
= difficult, the material is abstract so students need other references
11. What do you think if teaching materials were provided in the form of independent curriculum-based textbooks on basic chemical law material around us which were equipped with components (such as, more detailed material content, there were multi-representations that were easy to understand, display more interesting books and activities that can help students improve their understanding of the material) ?
= very helpful for students and teachers because the books available are still few
12. In your opinion, will students be interested and helped if learning about basic chemical laws around us uses textbooks based on the independent curriculum which are equipped with the components above?
= very helpful to understand the material that can support learning

I would like to thank you for taking the time to answer questions according to the actual situation.

Figure 2. Teacher Interview Results

Context Analysis

Context analysis involves the examination of the curriculum and syllabus as a means of understanding the educational framework and content. This analysis was carried out to identify, detail, and systematically arrange the scope of learning outcomes, materials and textbooks to be developed. In the first step, an analysis of the learning outcomes that students must have in accordance with the demands of an independent curriculum is carried out. This analysis was carried out on basic chemical law material around us for stage E SMA/MA. The results of the context analysis can be seen in the figure in Figure 3.

Analysis of Learning Outcomes (CP) Phase E Class X

Learning Achievement (CP)	Standard Content of CP	Content Standards from Permen no.7 of 2022
Students are able to observe, investigate and explain phenomena according to scientific work principles in explaining chemical concepts in everyday life; applying chemical concepts in environmental management including explaining the phenomenon of global warming; write down chemical reactions and apply basic chemical laws; understand atomic structure and its applications in nano-technology.	1. Apply the basic laws of chemistry in everyday life	1. Basic laws of chemistry and their application to reactions and chemical processes, principles and rules for electron configurations, valence electrons, periodic system of elements, molecular formulas, empirical formulas, molecular shapes and models

Figure 3. Context Analysis

Study of literature

At this stage, sources and sources related to research activities are sought. Books, journals, or online resources can be sources and references. This book identifies, details and explains at this step, as well as the main concepts learned, so that they form a concept analysis as an easy map.

Conceptual Framework Development

Needs and context analysis, as well as a comprehensive survey of the literature, formed the basis for developing the conceptual framework. In this study, we collect contexts of thought by relating the problems obtained from the needs analysis and context analysis to the literature survey as a reference. Based on these results, it will later become the basis for designing textbooks to support an independent curriculum of basic chemical law material around us for Stage E SMA/MA. The conceptual framework procedure carried out by the researcher can be seen in Figure 4.

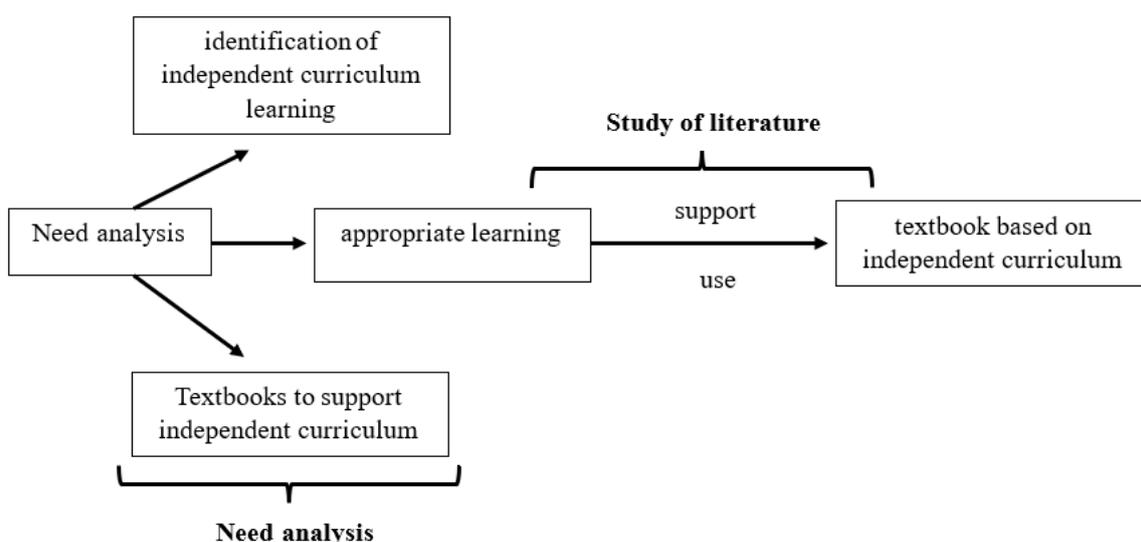


Figure 4. Conceptual Framework

Stages of Prototype Development and Formation

At this stage, the design of a chemistry textbook on the basic laws of chemistry is carried out around us. Activities that have been carried out include designing textbooks. The textbook was designed using the Canva application and the word application in its creation. The material chosen in this textbook is the application of the basic laws of chemistry in everyday life (Lavoisier's Law, Proust's Law, Dalton's Law, Boyle-Gay Lussac's Law and Avogadro's Hypothesis) and the application of the basic laws of chemistry to solve cases in everyday life. The structure of the digital textbook made consists of a cover, preface, table of contents, learning outcomes, concept maps, learning objectives, materials, activities, sample questions, discussion, key understanding, summary, bibliography, and preparation of research instruments and the realization of the design designed.

The next stage is the realization of textbooks that have been made then realized. The results of this design realization are referred to as prototype 1, which is carried out next: first, self-evaluation of prototype 1, aims to see the completeness of the contents and design specifications of the textbook (prototype 1). This evaluation was carried out using a checklist of characteristics or design specifications based on self-evaluation, it was seen that there were still deficiencies in the textbooks, namely the comprehension test and bibliography were not yet in the textbooks. The results of the revised self-evaluation are in the form of prototype 2.

Validity Results

The product validation results are in the form of textbooks that have been developed and then validated by experts from 3 chemistry lecturers and 2 chemistry teachers. Validation was carried out to determine the validity of the developed textbooks. The validation instrument used has an assessment component which includes a content component (CC), a presentation component (PC), a linguistic component (LC), and a graphical component (GC). The results of product validation by 5 validators, namely 3 chemistry lecturers at FMIPA UNP and 2 chemistry teachers at SMAN 8 Padang can be seen in Figure 5.

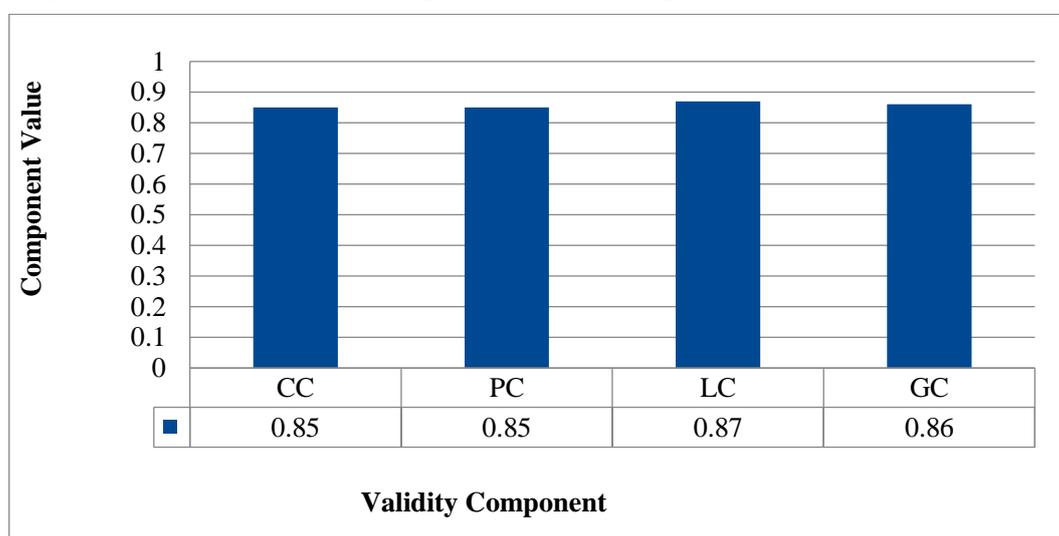


Figure 5. Validation Results

The data analysis in the figure indicates that the validation values for each component, as assessed by three chemistry lecturers from FMIPA UNP and one chemistry teachers from SMAN 8 Padang, range from 0.85 to 0.87. These values fall within the valid category, demonstrating the overall validation of the components. The average value of textbook validation results to support Mardeka curriculum learning on basic chemical law material around us by the validator is 0.86 which is included in the valid category. The content

component (CC) consists of 1) suitability of the material, 2) suitability of the contents of the textbook, 3) suitability of the questions, 4) suitability of the questions, 5) suitability of the questions. Content component validation results vary from 0.80 to 0.95. The value given by the validator for each content component is categorized as valid.

The presentation component (PC) consists of 1) learning objectives, 2) pictures, 3) materials, 4) learning outcomes, 5) examples of questions and discussions, 6) summaries, 7) exercises and bibliography. The presentation component validation results were between 0.80 and 0.90. The value given by the validator for each presentation component is categorized as valid. The third component is the linguistic component (LC), namely 1) forms and letters, 2) instructions and information, 3) the language used, 4) procedures for writing. The results of the language component validation varied from 0.80 to 0.95. The value given by the validator for each linguistic component is categorized as valid. The fourth component is the graphic component (GC), namely 1) the use of font size, 2) the appearance of the textbook is attractive, 3) the images used are attractive, 4) the systematics of textbooks according to the Mardeka curriculum. The language component results varied from 0.80 to 0.90. The value given by the validator for each graphic component is categorized as valid.

Furthermore, the one-to-one evaluation shows that the textbooks developed have been able to help students understand the basic laws of chemistry around us. The components of the one-to-one evaluation are 1) the appearance of the cover of the developed textbook is attractive, 2) the textbook can increase learning motivation, 3) the pictures in the textbook are attractive, 4) the material and language used are easy to understand, 5) the material in the teaching material book can improve understanding of the material. The results of the one-to-one evaluation and the validator's suggestions at the validation stage were used to revise the textbooks being developed so that a valid prototype 3 was obtained.

Practical results

Small group trials were carried out on prototype 3. This test aims to determine the practicality of prototype 3 that has been produced. The results of the practicality test of students and teachers at SMAN 8 Padang are to find out the practicality of the products that have been developed. The practicality instrument used has an assessment component which includes ease of use (EU), appearance (AR), learning efficiency (LE), and the benefits of textbooks (TB). Analysis of each practicality component can be seen in Figure 6.

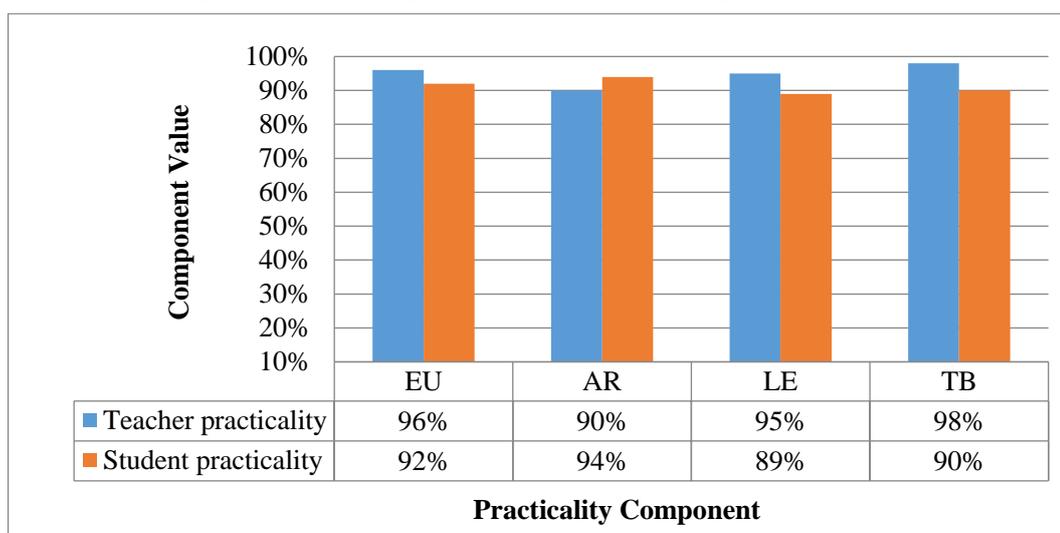


Figure 6. Practical Results

Based on the data analysis the practicality component is in the very practical category with a score range of 89% to 94% by 9 students and 2 chemistry teachers at SMAN 8 Padang, namely 90% and 98%. The average results of the practicality test of textbooks by 9 students and 2 chemistry teachers at SMAN 8 are in the very practical category with a score of 92% and 95%. The value given by the chemistry teacher and phase E students of SMAN 8 Padang on the practicality test sheet instrument states that the textbook to support the Freeman curriculum learning about basic chemical laws around us is very practical to use in learning chemistry. Ease of use component indicators consist of 1) Language, 2) letters, 3) material, 4) flow between chapters and sub-chapters, 5) pictures and questions. The results of the analysis of useful indicators by chemistry teachers at SMAN 8 Padang are 80% to 100%. The average value of the ease of use component indicator is 96% in the very practical category. While the results of the analysis of the indicators of the benefits of phase E students at SMAN 8 Padang are 87% to 100%. The average value of the ease of use component indicator is 92% in the very practical category.

The display component has indicators 1) covers, 2) pictures and illustrations. The results of the analysis of display component indicators by chemistry teachers at SMAN 8 Padang are 80% to 100%. The average display component indicator value is 90% in the very practical category. While the results of the analysis of display component indicators by Phase E students of SMAN 8 Padang were 89% to 98%. The average display component indicator value is 94% in the very practical category.

The components of learning efficiency by chemistry teachers at SMAN 8 Padang consist of indicators of learning time and learning process activities with a value of 90% to 100%. The average score on the indicator of the learning efficiency component is 95% in the very practical category. While the learning efficiency component of Stage E students at SMAN 8 Padang consists of indicators of study time and learning process activities with a value of 89%. The average value of the learning efficiency component indicator is 89% in the very practical category.

The components of the benefits of textbooks consist of indicators 1) textbooks can guide students, 2) there are let's practice activities, activities and experiments, 3) can solve problems, 4) activities are easier. The results of the usefulness indicator analysis by the chemistry teacher at SMAN 8 Padang with a score of 90% to 100%. The average value of the ease of use component indicator is 98% in the very practical category. While the results of the analysis of the indicators of benefits by stage E students of SMAN 8 Padang with a value of 87% to 93%. The average value of the ease of use component indicator is 90% in the very practical category.

The results of the study show that the textbooks supporting the learning of the Mardeka curriculum on basic chemical law materials around us are declared valid and very practical in learning chemistry. These results are in accordance with research conducted by Dika Tri Andani and Muammar Yulian (2018), Wilda Syahri, Muhaimin, and Devi Trianauli Sirait (2016) and that the textbook Basic Chemical Law Material is valid and practical to use. This is in line with Edi Elisa's research that textbooks are in the very proper category after the validity and practicality test stages are carried out (Elisa et al., 2020). The following are the results of the cover and main display of chemistry textbooks which are valid and very practical for use in chemistry learning can be seen in Figure 7.

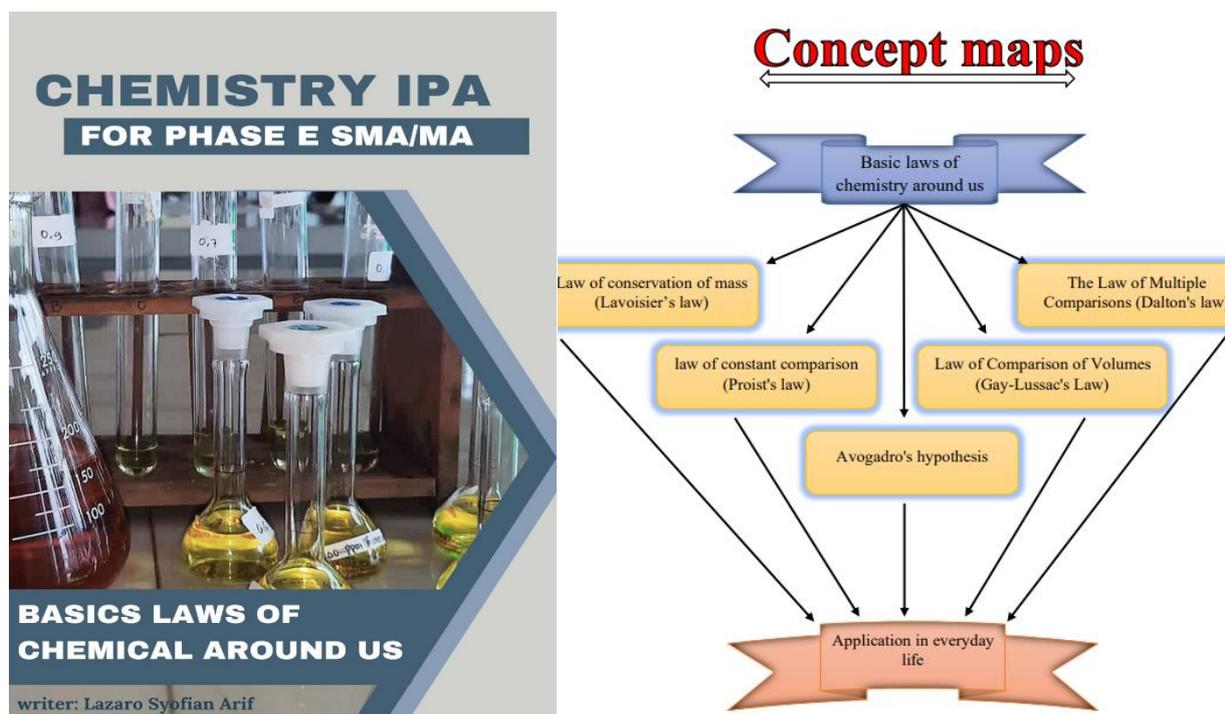


Figure 7. (a) Textbook Cover Display, (b) Textbook Material Content Display

Textbooks can motivate students to learn because the cover display, color design, and attractive pictures, as well as the presentation of the material and language used in textbooks are easy for students to understand so that they can increase their understanding of the material they are studying. This is in line with Muslim & Ardhana, (2023) which states that the learning process using textbooks can attract students' attention, increase learning motivation, increase activeness, independence in learning, and not be boring.

Textbooks have the potential to assist students in discovering concepts while they engage in learning. This is due to the fact that the comprehension test questions and practice exercises included in the textbooks align with the learning objectives of the Mardeka curriculum. Consequently, these resources can aid students in consolidating their understanding of the concepts. This aligns with the viewpoint expressed by Loewen, which suggests that the inclusion of challenging questions in the learning process can enhance higher-order thinking skills (HOTS), generate interest, and boost student motivation. Moreover, students tend to become enthusiastic when they are presented with challenging comprehension test questions and exercises. This, in turn, can contribute to an increase in student motivation levels (Mawardi et al., 2020).

This research is focused on developing a textbook. Textbooks to support the learning of the Mardeka curriculum as the findings of this study. This textbook can provide encouragement to students in exploring, expanding and explaining learning materials in the independent curriculum. The basic chemical law textbooks around us contain material content on Lavoisier's Law, Proust's Law, Dalton's Law, Boyle-Gay Lussac's Law and Avogadro's Hypothesis. In addition, the chemistry textbooks produced can also help students to understand and explore the substance of the material. The textbooks developed can make students interested in studying the textbooks (Rahmiati & Mawardi 2016). The implication of the results of this study is that teachers must provide learning motivation, guide, and direct students in learning. The development of the textbooks that were made was limited to material on the basic laws of chemistry around us, phase E at SMAN 8 Padang.

CONCLUSION

After conducting the research and engaging in discussions, two conclusions can be drawn. Firstly, the validity of the developed textbooks, specifically focused on the basic laws of chemistry in Phase E, falls within the valid category. The average value of 0.86 was determined based on assessments provided by five validators, consisting of three chemistry lecturers from FMIPA UNP and two chemistry teachers from SMAN 8 Padang. The chemistry textbooks were found to be valid across four components, namely content, presentation, language, and visuals. Secondly, the practicality of utilizing the aforementioned textbooks on the basic laws of chemistry around us was deemed highly practical. According to chemistry teachers at SMAN 8 Padang, the textbooks received an average score of 95%, while students at SMAN 8 Padang rated them at 92%. The practicality of the textbooks was evaluated based on four components: ease of use, visual appeal, effectiveness in learning, and the benefits provided by the textbooks. As a result, it can be concluded that the textbooks on the basic laws of chemistry in Phase E are both valid and highly practical for use in chemistry education.

Bibliography

- Angga, A., Suryana, C., Nurwahidah, I., Hernawan, A. H., & Prihantini, P. (2022). Comparison of the Implementation of the 2013 Curriculum and the Merdeka Curriculum in Elementary Schools in Garut Regency. *Basicedu Journal*, 6(4).
- Aumi, V., Mawardi, M & Zainul, R. (2018). Pengembangan Bentuk Lembar Kerja Siswa (Lks) Untuk Aktivitas Kelas Dan Laboratorium Berbasis Inkuiri Terbimbing Pada Pokok Bahasan Laju Reaksi.
- Devirita, F., Neviyarni, N., & Daharnis, D. (2021). Pengembangan Buku Ajar Berbasis Problem Based Learning di Sekolah Dasar. *Jurnal Basicedu*, 5(2), 469–478.
- Dinda., Raupu, S & Mawardi. (2022). Pengembangan Lembar Kerja Siswa dengan Pendekatan Kontekstual pada Subtema Manusia dan Lingkungan Berbasis Ayat-Ayat Al-Qur'an. *Jurnal Basicedu*, 6 (6), 9356 – 9368.
- Djamara, 2008. Hubungan Motivasi Belajar Terhadap Hasil Belajar (Online), (<http://repository.usu.ac.id/bitstream/123456789/23727/4/Chapter%20II.pdf>, di akses tanggal 20 Mei 2023).
- Fani., V & Mawardi, M. (2022). Sistem Pembelajaran Flipped Classroom Berbasis Inquiry Terbimbing Menggunakan Moodle ON Solusi Asam-Basa. *Jurnal Pijar MIPA*, Vol. 17 (3), 361-368.
- Fitriya, D. (2018). Development of an Interactive Book "Chemistry For Kids" as a Media for Introducing Chemicals for Children.
- Herpika, F & Mawardi, M., (2021). Validitas Sistem Pembelajaran Flipped Classroom Berdasarkan Guided Inquiry Bentuk Molekuler Menggunakan Augmented Reality untuk Siswa Kelas X SMA/ MA. *Jurnal Internasional Ilmu Pengetahuan dan Teknologi Progresif (IJPSAT) ISSN: 2509-0119*.
- Juliani, A. J., & Bastian, A. (2021). Pendidikan Karakter sebagai Upaya Wujudkan Pelajar Pancasila. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas PGRI Palembang*, 257–265.
- Kemendikbud. (2020). *Surat Edaran Pelaksanaan Kebijakan Pendidikan dalam Masa Darurat Penyebaran Coronavirus Disease (covid- 19)*.
- Lydra, I., Mawarnis, E., & Herman, M. (2023). Pengembangan LKS Berbasis Learning Cycle

- 5E pada Materi Stoikiometri. *Hidrogen: Jurnal Kependidikan Kimia*, 11(2), 149-157.
- Mawardi, M., Rusiani, A & Yani, F. (2020). Keefektifan LKS berbasis inkuiri terbimbing pada materi asam basa untuk meningkatkan kemampuan berpikir tingkat tinggi (HOTS) siswa. *The 2nd International Conference on Research and Learning of Physics IOP Conf. Jurnal Fisika*.
- Muslim, F., & Ardhana, I. (2023). Pengembangan Media Laboratorium Virtual Kimia Berbasis Android Pada Materi Asam Basa Untuk Siswa Kelas XI SMA. *Hidrogen: Jurnal Kependidikan Kimia*, 11(2), 166-177.
- Nieveen, N., & Folmer, E. (2013). Educational Design Research Educational Design Research. *Netherlands Institute for Curriculum Development: SLO*, 1–206.
- Nuryasana, E., & Desiningrum, N. (2020). Pengembangan buku ajar strategi belajar mengajar untuk meningkatkan motivasi belajar siswa. *Jurnal Inovasi Penelitian*, 1(5), 967-974.
- Piawi, K., Nizar, M & Mawardi. (2018). Pengembangan LKS berbasis inkuiri terbimbing dengan aktivitas kelas dan laboratorium pada materi termokimia. *Jurnal International Conferences on Education, Social Sciences and Technology*.
- Plomp, T., & Nieveen, N. (2013). Educational Design Research Educational Design Research. In T. Plomp & N. Nieveen (Eds.), *Netherlands Institute for Curriculum Development: SLO. Netherlands Institute for Curriculum Development (SLO)*.
- Purwanto, M. N. (2010). *Prinsip-Prinsip dan Teknik Evaluasi Pengajaran*. Remaja Rosda Karya.
- Rahimah, R. (2022). Peningkatan Kemampuan Guru SMP Negeri 10 Kota Tebingtinggi Dalam Menyusun Modul Ajar Kurikulum Merdeka Melalui Kegiatan Pendampingan Tahun Ajaran 2021/2022. *Jurnal ANSIRU PAI: Pengembangan Profesi Guru Pendidikan Agama Islam*, 6 (1), 92-106.
- Rahmiati, Sari & Mawardi. (2016). "Teaching Materials Development of Student Work Sheet (SWS) Guided Inquiry Based on the Materials for Learning Rate of Chemical Reaction". *Proceedings of Academics World 28th International Conference, 28th March 2016. Tokyo, Japan*.
- Rosidah, R., Wasonowati, T., Redjeki, T., & Dwi, R. (2014). *Penerapan Model Problem Based Learning (PBL) pada Pembelajaran Hukum Dasar Kimia Ditinjau dari Aktivitas dan Hasil Belajar Siswa Kelas X IPA SMA Negeri 2 Sukarta Tahun Pelajaran 2013 / 2014*. 3(3).
- Sukerni, P. (2014). Pengembangan Buku Ajar Pendidikan Ipa Kelas Iv Semester I Sd No. 4 Kaliuntu Dengan Model Dick and Carey. *JPI (Jurnal Pendidikan Indonesia)*, 3(1), 386–396.
- Sukerni, P. (2014). Pengembangan Buku Ajar Pendidikan Ipa Kelas Iv Semester I Sd No. 4 Kaliuntu Dengan Model Dick and Carey. *JPI (Jurnal Pendidikan Indonesia)*, 3(1), 386–396. <https://doi.org/10.23887/jpi-undiksha.v3i1.2920>
- Sulkipani, S., Nurdiansyah, E., Waluyati, S. A., & ... (2022). Pengembangan Buku Ajar Pendidikan Karakter Berbasis Kearifan Lokal. ... *Ilmu Pendidikan PKN ...*, 6(1), 5–6.
<http://194.59.165.171/index.php/CC/article/view/686>
<http://194.59.165.171/index.php/CC/article/download/686/607>.

- Sumarsih, I., Marliyani, T., Hadiyansah, Y., Hernawan, A. H., & Prihantini, P. (2022). Analisis Implementasi Kurikulum Merdeka di Sekolah Penggerak Sekolah Dasar. *Jurnal Basicedu*, 6(5), 8248–8258. <https://doi.org/10.31004/basicedu.v6i5.3216>
- Tri, D., & Yulian, M. (2018). *Pengembangan Buku ajar Electronic Book Menggunakan Software Kvisoft Flipbook Pada Materi Hukum Dasar Kimia di SMA Negeri 1 Panton Reu Aceh Barat*. 02(01), 1–6.