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Development of Merdeka Curriculum's Teaching Module as a Student-Centered Learning Plan Supported by E-learning Media

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Abstract: Teaching module is a learning plan document designed to guide teachers in carrying out daily instruction. Every teacher needs to have a well-structured learning plan to direct the learning process effectively and purposefully. Through this research, the researcher identified and described a teaching module based on *Merdeka* Curriculum as a learning plan that supports student-centered learning assisted by e-learning media. Student-centered learning is operationalized as a learning process that provides space for students to be more active in the learning process. The learning plan is designed using asynchronous e-learning media and Chromebook devices. A cooperative learning model was chosen as the main approach because it can accommodate elements of student-centered learning. The teaching module was developed with specifications consisting of general information components, core components, and appendices. Module validation was carried out by experts through assessments of quality and relevance, content structure, and language use. The validation results indicated a very high level of validity, with a score of 351 out of a maximum of 375, averaging 93.60% (categorized as very valid based on the Likert scale). The module was deemed feasible for use as a learning plan and was considered capable of facilitating student-centered learning. The follow-up to this research is the development of e-learning media in forms and specifications that align with the learning plans outlined in the teaching module.

Keywords: *Merdeka* Curriculum, Teaching Module, Student-Centered Learning, E-learning, Cooperative Learning

INTRODUCTION

The curriculum serves as a tool to achieve educational goals and also acts as a guideline for the implementation of education. It encompasses intentions, objectives, content, processes, resources, and assessment tools for all planned learning experiences intended for students both inside and outside of school and in society, through classroom instruction or related programs (Robertson & Shaw, 1977). Since Indonesia's independence in 1945, the national education system has undergone ten curriculum transformations. These changes began with the 1947 curriculum, followed by the 1954 curriculum, the 1968 curriculum, the 1973 curriculum known as the Pioneer Development School Project, the 1975 curriculum, the 1984 curriculum, the 1994 curriculum, the 1997 curriculum (a revision of the 1994 curriculum), the 2004 curriculum introduced as the Competency-Based Curriculum, the 2006 School-Based Curriculum (KTSP), the 2013 curriculum, and currently, the Merdeka Curriculum (Purba et al., 2023).

The Merdeka Curriculum was officially launched by the Ministry of Education, Culture, Research, and Technology in the 15th episode of the Merdeka Belajar (Freedom to Learn) initiative, with the aim of recovering learning loss that had long affected education in Indonesia (Nurani et al., 2022). This curriculum seeks to provide students with opportunities to learn in more creative, flexible, and actively engaging ways. It aims to develop 21st-century skills and soft skills such as critical thinking, collaboration, communication, creativity, adaptability, and good character (Lidiawati et al., 2023). Ministerial Regulation of Education, Culture, Research, and Technology Number 8 of 2024 states that the content standards at the primary education level are designed based on student graduation competency standards. These standards emphasize character formation aligned with the values of Pancasila, as reflected in the dimensions of the Pancasila Student Profile. The

learning content within these standards is structured to encourage students' self-development and strengthen socio-economic aspects by taking into account the diversity of natural resources, socio-cultural richness, and the dynamics of scientific and technological development. Furthermore, Ministerial Decree No. 262 of 2022 explains that the structure of learning activities at the elementary school level should be designed to provide active, interactive, collaborative, enjoyable, and locally-based learning experiences, thus making learning meaningful and student-centered.

Instruction that meets the content and structural standards of the Merdeka Curriculum can be implemented through the development of the teaching module. The teaching module is a learning plan document designed to guide teachers in carrying out daily instruction. Every teacher needs to have a well-structured learning plan to direct the learning process effectively and purposefully. In the Merdeka Curriculum, teaching module help teachers teach more flexibly and contextually, without relying solely on textbooks (Ginanto et al., 2024). Teaching module play a key role in creating more adaptive learning activities because they can be designed to suit students' conditions and needs, enabling each student to achieve targeted competencies optimally. Additionally, the development of teaching module can be adjusted to the specific context of the school, such as its environment, the availability of facilities and infrastructure, and other factors (Nurani et al., 2022).

Based on the above explanation, as a form of concern for education, the researcher was motivated to develop a teaching module as a student-centered learning plan for the mathematics subject, supported by e-learning media. E-learning was used as a supplementary learning tool in the development of this teaching module. This decision was made because e-learning media, according to several studies, is considered effective for learning. A meta-analysis conducted by Dewi & Ni'mah (2024) reviewed 23 scientific articles related to the use of e-learning. The analysis concluded that the use of e-learning has a positive and significant effect on learning outcomes. The use of various e-learning platforms can provide new environments and experiences in the learning process that are interactive and student-centered, especially when learning is integrated with educational games, making it more engaging for students.

METHODS

The research conducted is a development study (research and development). This study was carried out based on the stages of the Thiagarajan development model (4D), which includes define, design, development, and dissemination (Thiagarajan, 1974). The research was conducted at SD Negeri 248 Palembang in Grade IV. This study produced a teaching module as a student-centered learning plan supported by e-learning media, focusing on the topic of the characteristics of quadrilaterals. The module was found to be valid. Data collection was conducted using a questionnaire distributed to experts (validators). Data analysis was performed by calculating and interpreting the results obtained from the questionnaire. The questionnaire responses were scored on a scale from 1 (strongly disagree) to 5 (strongly agree), reflecting the level of agreement with each item.

Table 1. Validity score in the questionnaire

Score	Response Category
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

(Source: Sugiyono, 2022)

After the questionnaire data is obtained, it is then calculated using the following formula:

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

Explanation:
P : Persentage
∑x : Total score obtained
∑xi : Maximum possible score

The percentage obtained from this calculation process is then interpreted into the criteria for the level of validity, with an achievement range from 0% to 100%, where the validation criteria range from not valid to highly valid.

Table 2. Validity criteria based on the Likert scale

Achievement Level (%)	Validity Criteria
81% - 100%	Very Valid
60% - 80%	Valid
40% - 60%	Fairly Valid
20% - 40%	Less Valid
0%- 20%	Not Valid

(Source: Adapted from Cabiago, 2021)

FINDINGS AND DISCUSSION

This development research is limited only to the development stage, meaning that the teaching module is developed up to the validity level only. This is because the module will be implemented in the learning process alongside the trial implementation of the e-learning media, which is currently also being developed by the researcher. In other words, the teaching module serves as a guide for the development of the e-learning media. The following are the findings from the development of the teaching module in the define, design, and development stages.

Define Stage

1. Curriculum Analysis

In the *Merdeka* Curriculum, there are learning outcomes that serve as references for teachers and educational units in planning instruction. Learning outcomes represent the competencies that students must achieve at each phase (Anggraena et al., 2022). At the elementary school level, grades 1 and 2 are in Phase A, grades 3 and 4 are in Phase B, and grades 5 and 6 are in Phase C. Simply put, learning outcomes are the competencies that students must gradually acquire in each of these phases, from Phase A to Phase C (Mulyasa, 2023). According to the Decree of the Head of the Agency for Standards, Curriculum, Assessment, and Learning of the Republic of Indonesia Number 033/H/KR/2022, the mathematics learning outcomes in Phase B are categorized into five elements: numbers, algebra, measurement, geometry, and data analysis and probability. Table 3 below presents the learning outcomes for the geometry element in Phase B of the *Merdeka* Curriculum.

Table 3. Mathematics learning outcomes for phase B in geometry element

Elemen	Learning Outcome
Geometry	By the end of Phase B, students are able to describe the characteristics of various two-dimensional shapes (quadrilaterals, triangles, polygons). They can compose and decompose various two-dimensional shapes in more than one way, where possible.

(Source: Decree of the Head of the Agency for Standards, Curriculum, Assessment, and Learning Number 033/H/KR/2022)

In addition to learning outcomes, the *Merdeka* Curriculum also includes learning dimensions that reflect the values of *Pancasila*, referred to as the *Pancasila* Student Profile. These dimensions include: 1) Faith in God Almighty, piety, and noble character; 2) Global diversity; 3) Cooperation; 4) Independence; 5) Critical thinking; and 6) Creativity. At least one of these six dimensions must be integrated into the preparation of lesson plans (Nuraini et al., 2022).

2. Learning Content Analysis

Based on the Mathematics for Elementary School/Islamic Elementary School Grade IV textbook published by the Book Center, Agency for Standards, Curriculum, and Educational Assessment of the Ministry of Education, Culture, Research, and Technology (Hobri et al., 2023), the topic on the characteristics of quadrilaterals is part of the geometry element learning outcomes in the *Merdeka* Curriculum. The characteristics of quadrilaterals studied include seven shapes: square, rectangle, trapezoid, rhombus, kite, parallelogram, and irregular quadrilateral.

3. Learning Facilities Analysis

SD Negeri 248 Palembang has adequate facilities to support learning, one of which is the availability of Chromebooks. Chromebook can be used as learning tools in the classroom. A Chromebook is a laptop developed by Google, equipped with various features and strong security. Chromebooks are safe for students to use, user-friendly, and automatically updated, with management supported through the belajar.id account (Astuti et al., 2023). The use of Chromebook can enhance students' learning interest. They can easily access learning resources and actively participate in more interactive and student-centered learning activities (Gunawan et al., 2024).

Design Stage

The teaching module or lesson plan is developed through three stages. These stages involve understanding the learning outcomes, starting from the rationale, objectives, and characteristics of the learning process. The thinking process in developing the teaching module is shown in Figure 1 below.

Figure 1. Thinking process in developing the teaching module.
(Source: Learning and Assessment Guide, Ministry of Education, Culture, Research, and Technology, 2024)

The government has set learning outcomes as the targeted competencies. However, learning outcomes are not concrete enough to guide daily learning activities. Therefore, learning outcomes need to be broken down into more operational and concrete learning objectives, which students achieve step by step until they reach the end of the phase. For this reason, in developing this teaching module, the researcher formulates learning objectives derived from the learning outcomes. Table 4 below presents the learning objectives used in teaching the topic of characteristics of quadrilaterals.

Table 4. Learning outcomes and learning objectives

Learning Outcomes	Learning Objectives
By the end of Phase B, students are able to describe the characteristics of various two-dimensional shapes (quadrilaterals, triangles, polygons). They can compose and decompose various two-dimensional shapes in more than one way, where possible.	1. Students are able to accurately describe the characteristics of quadrilaterals. 2. Students are able to correctly compose various quadrilaterals based on their characteristics. 3. Students are able to properly decompose the characteristics of quadrilaterals.

After establishing the learning objectives, the researcher then determines the specifications of the teaching module. These specifications are based on the standard components set by the Ministry of Education, Culture, Research, and Technology. The teaching module is prepared and developed according to the components of the *Merdeka* Curriculum teaching module formulation, which have been set by the Curriculum and Learning Center of the Agency for Standards, Curriculum, Assessment, and Learning. These components include general information, core components, and appendices. Table 5 outlines the specifications of the teaching module.

Table 5. Teaching module specifications

General Information Components	Core Components	Appendices Components
1. Identity 2. Initial competence 3. *Pancasila* student profile 4. Facilities and infrastructure 5. Target students 6. Learning model	1. Learning objectives 2. Meaningful understanding 3. Trigger questions 4. Learning activities 5. Assessment 6. Enrichment and remedial	1. Assessment instruments 2. Teaching materials 3. Student worksheets 4. Reading materials for teachers and students 5. Glossary 6. References 7. Author's biography

Source: Adaptation of the Learning and Assessment Guidelines, Ministry of Education, Culture, Research, and Technology (2024)

After determining the specifications of the teaching module, the researcher then formulates the concept of the module as a student-centered lesson plan. Student-centered learning is a process that shifts the focus from the teacher (teacher-centered) to the students, with the expectation that students will be actively involved in constructing their own knowledge, attitudes, and skills (Panggabean et al., 2021). Based on an analysis of several sources, the teaching module developed by the researcher is designed to meet the following characteristics of learning:

a. Students are more actively engaged in the learning process to develop their knowledge and skills.
b. The learning process does not only emphasize mastery of content but also aims to foster students' character. The character development in this context refers to the values contained within the dimensions of the *Pancasila* Student Profile.
c. The teacher acts as a learning facilitator and is not the sole source of information. This means that students are encouraged to take initiative in seeking learning information from other sources.

Development Stage

1. Teaching Module Production

The production of the teaching module begins with the use of Microsoft Word to create a draft of the module, starting from the general information components, core components, to the appendices components. Several results from the production of this teaching module are presented in the Table 6 below (summary only, not the complete content).

Table 6. The result of teaching module production

Components	**Learning Plan**
Facilities and Infrastructure	Laptop and LCD projector, Chromebook, Belajar.id account, e-learning media, student worksheets, Grade IV Mathematics student textbook for Elementary School/Islamic Elementary School based on the *Merdeka* Curriculum, and writing tools.
Learning Model	Cooperative learning model with a student-centered learning approach. The instructional methods used include collaborative e-learning, computer-assisted instruction (CAI), lectures, presentations, and question-and-answer sessions.
Learning Activities	**Preliminary Activities (Opening Activities):** 1. Students enter the classroom and begin with a cheerful greeting activity. 2. The teacher greets the students and invites them to recite a learning prayer together. 3. The teacher checks in with the students by asking how they are, as a way to begin the teaching and learning session. 4. The teacher reviews the previous lesson on the definition of polygons and the characteristics of triangular shapes, then links it to the new topic on the characteristics of quadrilaterals. 5. The teacher displays images of the Sultan Mahmud Badaruddin II Museum and the South Sumatra State Museum, followed by prompting questions: 1) Have any of you ever visited these museums in Palembang? 2) Have you ever visited the Sultan Mahmud Badaruddin II Museum or the South Sumatra State Museum? 3) Do you know about or have you ever seen objects displayed in museums? 4) What kind of two-dimensional shapes do those objects have? What are the characteristics of those shapes? 6. Students respond to the prompting questions, after which the teacher explains the context and objectives of the lesson. **Main activities:** 1. Students use Chromebook and access the e-learning media. 2. Students click the "Learning Features" button to open the available learning feature options on the e-learning media. 3. The teacher gives a brief explanation about the functions of the learning features available on the e-learning media. 4. Students use one of the features in the e-learning media to study the material on the characteristics of quadrilaterals. The lesson is connected to cultural contexts in the city of Palembang.

5. Students ask the teacher questions related to the topic of quadrilateral characteristics that they have studied.
6. Students participate in an odd-even ice-breaking activity to refresh the atmosphere and maintain focus.
7. Students use one of the features in the e-learning media to assemble various quadrilaterals into the shape of an object found in everyday life.
8. The teacher guides and facilitates each group in assembling various quadrilateral shapes to resemble an everyday object.
9. After completing the arrangement, students answer the questions provided in the e-learning media. These questions aim to reinforce students' understanding of the arrangement they have done.
10. The teacher gives appreciation and reinforcement regarding the flat shapes contained in the object that students have created.
11. Students ask the teacher questions related to the arrangement activity they have just completed.
12. Students open the student worksheet page on the e-learning media, and the teacher distributes the student worksheet to each group to work on. The worksheet allows students to analyze the characteristics of quadrilaterals.
13. The techers explains the instructions for completing the student worksheet:
    1) In addition to the printed version given by the teacher, students can also read the worksheet available on the e-learning platform.
    2) The student worksheet is to be completed in groups within 20 minutes.
    3) Students are expected to read the questions carefully before answering and to actively collaborate with their group members.
    4) Answers should be written on the individual worksheets provided.
14. Students engage in discussion and cooperation with their group members to solve the problems in the student worksheet.
15. The teacher attentively and actively observes and assists students in completing the worksheet.
16. After the student worksheet is completed, each group presents their results, while other groups check their own answers.
17. The teacher gives appreciation and then provides reinforcement on the correct answers.

Closing activities:

1. Students present a summary of the lesson on the characteristics of quadrilaterals that they have learned.
2. The teacher leads a reflection session by asking the following questions:
    1) Did you experience any difficulties during the learning activity?
    2) Is there any part of the lesson on the characteristics of quadrilaterals that you do not yet understand?
    3) Is there anything you would like to ask regarding the characteristics of quadrilaterals?
3. The teacher gives appreciation and encouragement to the students to be more active in discussions, collaboration, and asking questions in future learning activities.
4. The teacher concludes the lesson on the characteristics of quadrilaterals and prepares to transition to the next subject.

Assessment	1. Diagnostic Assessment 1) Cognitive Assessment Aims to evaluate students' level of knowledge. It is conducted before the learning process using test techniques in the form of multiple-choice and essay questions. 2) Non-Cognitive Assessment Aims to identify students' characteristics and learning interests. It is conducted before the learning process using questionnaire techniques in the form of checklists and essay questions. 2. Formative Assessment Aims to assess attitudes based on the dimensions of the *Pancasila* Student Profile. This assessment is carried out during the learning process using non-test techniques in the form of observation. 3. Summative Assessment

Aims to measure students' level of knowledge. This assessment is conducted after the learning process using test techniques in the form of multiple-choice and essay questions.

After the module was completed, it was then designed using Canva for Education to make the appearance of the teaching module more attractive and visually original.

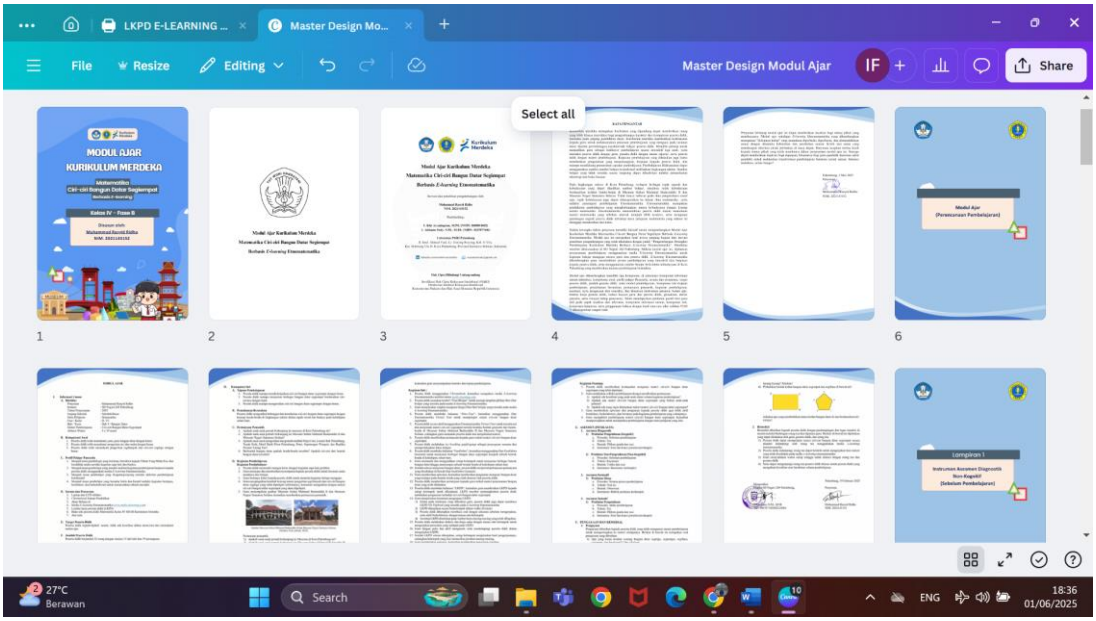

Figure 2. The production process of the teaching module using Canva for Education

2. Expert Review and Evaluation

The teaching module was then reviewed by three experts (validators). The evaluation involved one lecturer from Universitas PGRI Palembang, one teacher from SD Negeri 248 Palembang, and one teacher from SD Negeri 91 Palembang. The module was reviewed by the experts based on aspects of quality and relevance, general information components, core components, attachment components, and language usage. Based on the review, several revisions to the module were suggested by the experts. First, for the module cover, it was recommended to create a more attractive design that reflects elements of elementary school and mathematics. Figure 3 shows the changes made.

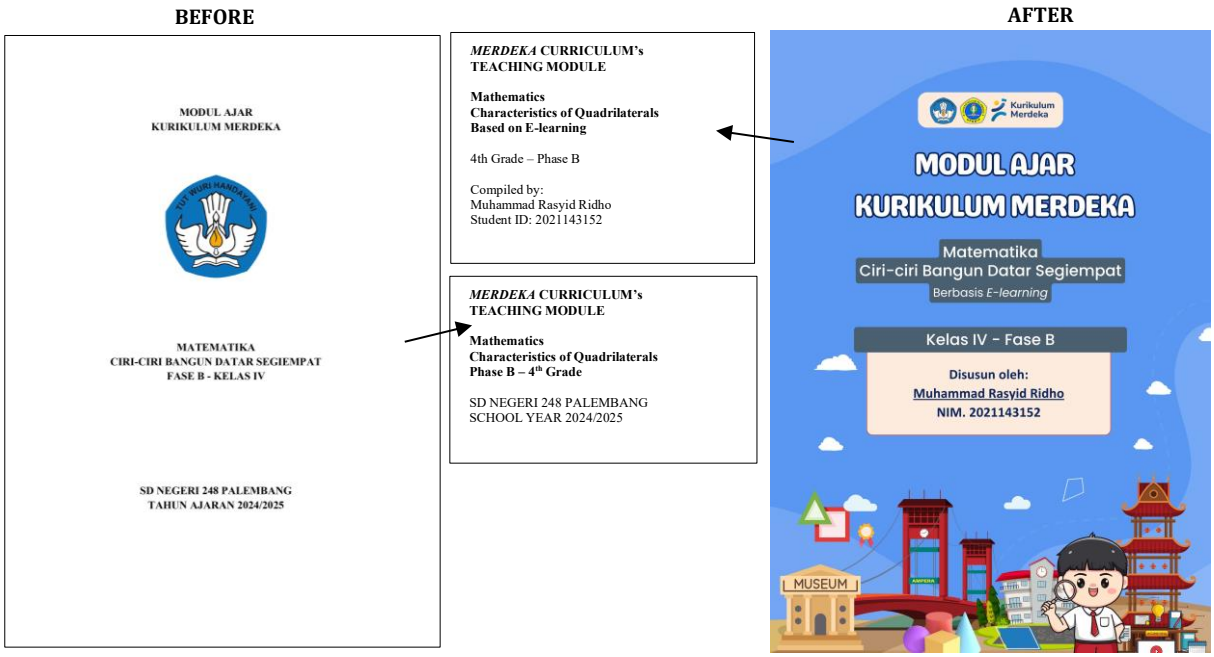

Figure 3. Revised cover of the teaching module

Second, in the content section of the module, it was suggested to add a border between the top and bottom margins. These changes are shown in Figure 4.

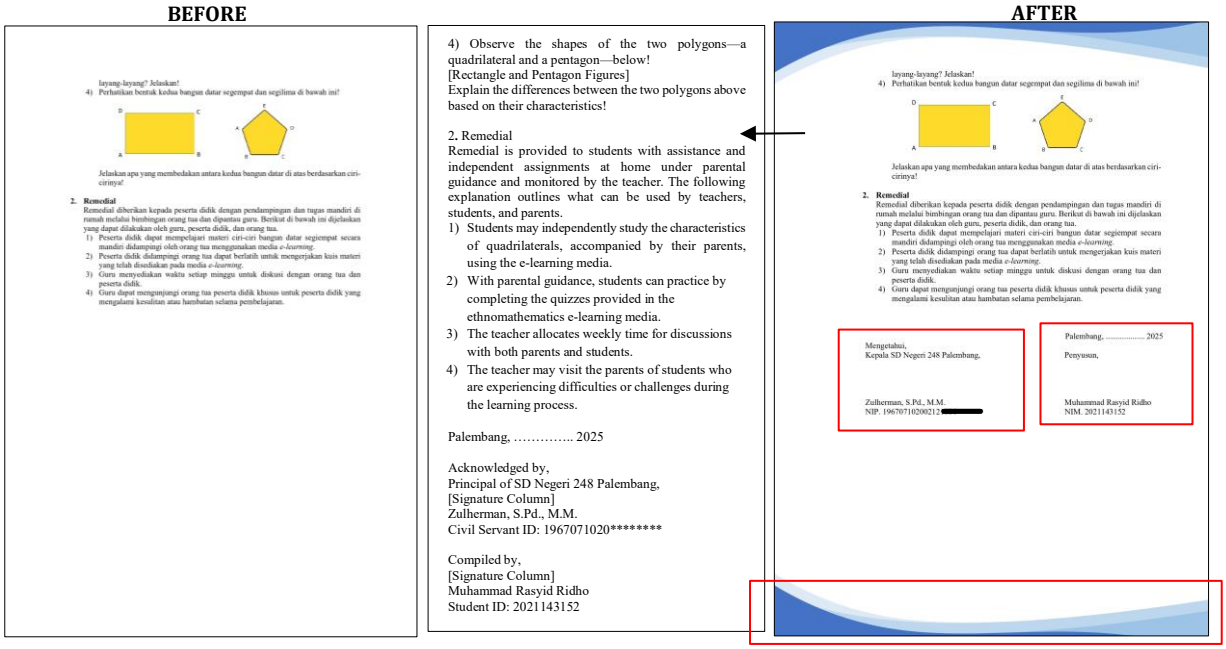

Figure 4. Revised page frame and signature column

Third, the question in item number 2 of the student worksheet should be adjusted to better align with the characteristics and abilities of fourth-grade students at SD Negeri 248 Palembang. The revision is shown in Figure 5.

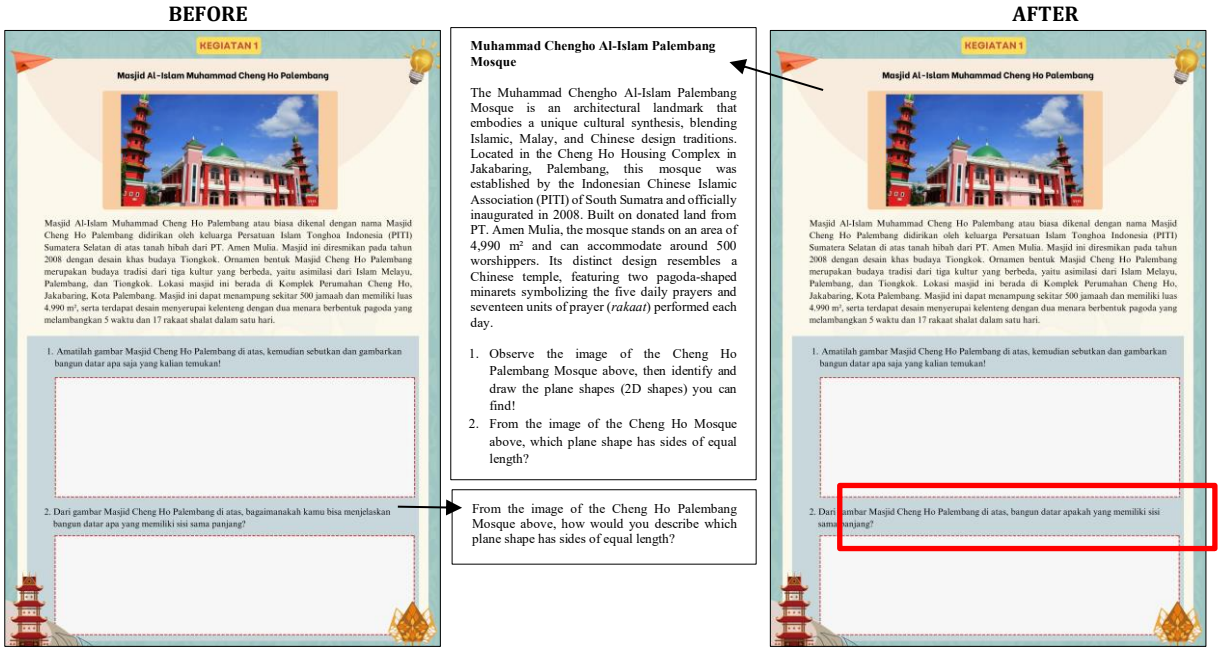

Figure 5. Revised student worksheet

Lastly, the experts suggested that once fully developed, the entire teaching module should be compiled into a complete document similar to a textbook. This document should include a cover page, author identity and copyright statement, preface, and the full content

of the module. The researcher has made the necessary revisions, and the next stage was for the experts to conduct an assessment of the module. Table 7 presents the results of that assessment.

Table 7. Expert evaluation result on the teaching module

No	Aspect	Validator			Total Score	Maximum Score	Average (Persentage)	Description
		1	2	3				
1	Quality and relevance	25	20	25	70	75	93,33 %	Very Valid
2	General information component	30	26	30	86	90	95,56 %	Very Valid
3	Core component	24	20	25	69	75	92 %	Very Valid
4	Appendices component	24	22	24	70	75	93,33 %	Very Valid
5	Language	18	18	20	56	60	93,33 %	Very Valid
Total		**121**	**106**	**124**	**351**	**375**	**93,60%**	**Very Valid**

Based on the data in Table 7, it is shown that the teaching module is suitable for use in the learning process, receiving a total score of 351 out of a maximum score of 375, with an average (percentage) score of 93.60%, which is categorized as very valid.

Discussion

This research was conducted with the aim of discovering and describing how a valid *Merdeka* Curriculum teaching module can support student-centered learning. Operationally, student-centered learning is defined as a learning process in which students are able to take a more active role. They are expected to recognize their responsibility in planning, organizing, and solving problems during the learning process (Wu & Huang, 2007). In the development stage, as previously explained in the production section, the planned learning process will utilize school-owned facilities and infrastructure to support student-centered learning—namely, the use of e-learning media and Chromebook.

The e-learning media prepared in this research is asynchronous e-learning. This type of e-learning involves the preparation of instructional materials beforehand, which are then uploaded to a learning site or platform. Students can access these materials anytime and anywhere to study them (Ko & Rossen, 2017). The e-learning platform and Chromebook function as complementary tools in the learning process. The researcher planned for students to use the e-learning platform to study, construct, and deconstruct the characteristics of quadrilateral shapes with the help of Chromebook. Within this framework, the application of e-learning is categorized as Computer Assisted Instruction (CAI). Sari et al. (2023) explain that CAI refers to the application of e-learning through computer use alongside traditional teaching methods. This method combines multimedia elements such as text, graphics, audio, and video to enhance learning. In other words, students can use Chromebook (computers) while simultaneously accessing the e-learning media. This learning takes place in the classroom with teacher guidance and supervision.

The learning activities in the teaching module are designed in accordance with the cooperative learning model. Cooperative learning is a model that involves students working together to achieve specific goals (Marasri, 2025). This model is considered appropriate for implementing student-centered learning because cooperative learning fulfills several essential elements: (1) interaction with teachers, peers, and learning materials; (2) meaningful learning; (3) respect for diversity; (4) enhancement of thinking skills; (5) varied learning climate; and (6) increased learning motivation (Jacobs et al., 2016).

In the planned learning activities, students are given multiple opportunities to engage in small group discussions (2–4 students) to solve problems or answer questions related to the construction and deconstruction of geometric shapes. Small group discussions encourage students to collaborate with their peers in exploring ideas and solutions. They may explore knowledge beyond what is outlined in the textbook, while still remaining within the

boundaries set by the teacher. Such discussions are a relevant practice to promote student-centered learning (Tang, 2023). In the teaching module, students are expected to discuss and collaborate using the e-learning platform. This approach is referred to as *collaborative e-learning*—a form of learning that generally involves interactive and collaborative processes supported by digital multimedia. Students can discuss, reflect, gather, and analyze learning information collaboratively through e-learning media (El-Mouthi et al., 2017).

Collaborative learning has a positive impact on students' learning motivation, critical thinking skills, social awareness, cognitive understanding, and open-mindedness (Warsah et al., 2021). However, despite these positive aspects, this type of learning also presents its own challenges. Students may become overly dependent on others in their group, resulting in minimal contribution—or worse, a complete lack of understanding of the material (Ghaith, 2018). Therefore, in the teaching module developed by the researcher, teachers are encouraged to be attentive and actively observe each student's engagement in the learning process. It is crucial for teachers to plan group composition and task instructions that align with student characteristics in order to optimize learning outcomes (Miller, 2020). First, teachers must determine the number of students per group. Second, they must assign group members strategically. Group member selection should consider factors such as intelligence, gender, race, and willingness to participate. Third, teachers should instill a clear understanding among students that they are responsible for participating actively and working collaboratively (Spooner, 2015). In addition, teachers need to develop a deeper understanding of collaborative (or cooperative) learning so they can more easily integrate it with the principles and/or structure of the curriculum (Baloche & Brody, 2017).

In the development of this teaching module, the researcher also incorporated assessments, including diagnostic, formative, and summative assessments. Learning and assessment are interconnected and inseparable. Both teachers and students must clearly understand the competencies to be achieved, in accordance with the learning objectives (Ginanto et al., 2024). Thus, the entire learning process is directed toward achieving these competencies. The relationship between learning and assessment is illustrated in Figure 6 below.

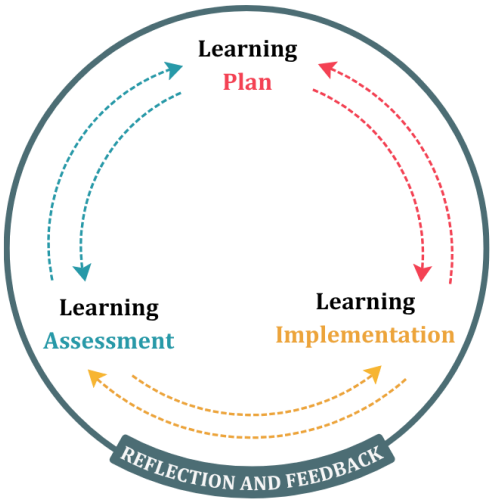

Figure 6. The relationship between learning and assessment

Learning plan, learning implementation, and learning assessment occur in a continuous and interconnected cycle. Throughout this process, teachers are encouraged to engage in reflection—either independently or with the support of colleagues, school principals, or supervisors. In this way, learning and assessment become an integrated whole, with the primary goal of supporting student learning success in the classroom.

CONCLUSION

Overall, the researcher has developed a teaching module that is suitable for presenting student-centered learning. The learning is

planned to encourage students to be more active and interactive through the use of e-learning media assisted by Chromebook, as well as the application of a cooperative learning model. The teaching module has been reviewed and assessed by experts based on quality and relevance aspects, general information components, core components, appendices components, and language use. The expert assessment showed positive results with a score of 351 out of a maximum score of 375, with an average (percentage) of 93.60% (very valid based on the Likert scale). The teaching module is considered appropriate for use in teaching and learning activities. The next step is to develop e-learning media in forms and specifications that can support the implementation of the learning process according to the learning plan in the teaching module.

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