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DEVELOPMENT OF DISCOVERY LEARNING-BASED STUDENT WORKSHEETS TO FACILITATE CRITICAL THINKING SKILLS IN PHASE D STUDENTS

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ABSTRACT The aim of this development research is to design discovery learning-based student worksheets (LKPD) to facilitate the mathematical critical thinking skills of Phase D students by meeting validity and practicality criteria. This study is motivated by the crucial role of critical thinking skills in students' education. The research employs a development method (R&D) following the 4-D model (define, design, develop, and disseminate). The study involved 15 students from Babussalam Junior High School, Pekanbaru, as the test subjects. Research instruments included a validation questionnaire to assess the validity of the LKPD and a student response questionnaire to evaluate its practicality. Based on the expert validator's analysis, the validity score was 94.43%, indicating the LKPD is highly valid. Meanwhile, the practicality score, derived from the student response questionnaire, was 87.98%, categorizing the LKPD as highly practical. Thus, the development of discovery learning-based LKPD is recommended for use in learning activities related to circle content to enhance the critical thinking skills of Phase D students.

Keywords: discovery learning-based student worksheets, mathematical critical thinking skills, 4-D development model, validity and practicality assessment

ABSTRAK Tujuan dari penelitian pengembangan ini adalah merancang LKPD berbasis discovery learning untuk memfasilitasi kemampuan berpikir kritis matematis siswa fase D dengan memenuhi kriteria validitas dan kepraktisan. Penelitian ini dilatarbelakangi oleh pentingnya kemampuan berpikir kritis dalam pendidikan siswa. Penelitian ini menggunakan metode pengembangan (R&D) dengan model 4-D (define, design, develop, and disseminate). Subjek penelitian melibatkan 15 siswa SMP Babussalam Pekanbaru. Instrumen penelitian meliputi lembar angket validasi untuk menilai validitas LKPD dan angket respons siswa untuk menilai kepraktisan LKPD. Berdasarkan analisis lembar validasi oleh validator ahli, skor validitas mencapai 94,43%, yang menunjukkan bahwa LKPD sangat valid. Sementara itu, skor kepraktisan dari angket respons siswa adalah 87,98%, yang menunjukkan bahwa LKPD sangat praktis. Oleh karena itu, pengembangan LKPD berbasis discovery learning direkomendasikan untuk digunakan dalam pembelajaran materi lingkaran guna meningkatkan kemampuan berpikir kritis siswa fase D.

Keywords: lkpd berbasis discovery learning, kemampuan berpikir kritis matematis, model pengembangan 4-D, validitas dan kepraktisan

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INTRODUCTION

In the era of Industry 4.0, which aligns with 21st-century education, mathematics education is increasingly required to cultivate students' critical mathematical thinking abilities (Purwasi & Fitriyana, 2020). This demand is reinforced by the independent curriculum, which aims to facilitate critical thinking skills through student-centered learning processes and the implementation of appropriate learning models (Novalina, 2023). Critical thinking in mathematics is essential for solving various mathematical problems, as students are expected to analyze, evaluate, and construct logical solutions (Effendi, Herpratiwi & Sutiarso, 2021). Martyanti & Suhartini (2018) define critical thinking as the ability to make decisions and take actions to solve problems, involving skills such as connecting concepts, creating alternative solutions, and analyzing and verifying results. Thus, fostering critical mathematical thinking is a crucial competency for students and a key objective in the implementation of the independent curriculum.

However, the mathematical abilities of Indonesian students remain a concern, as reflected in the 2018 Program for International Student Assessment (PISA) results. Indonesia ranked in the bottom six, with an average score of 379, far below the OECD average (OECD, 2019). PISA tasks, which require critical thinking, highlight the gap in students' ability to tackle problems that demand higher-order thinking skills (Girsang et al., 2022). Besides PISA, research has consistently shown that students struggle with analyzing and solving complex mathematical problems. This challenge is exacerbated by teacher-centered learning approaches, where students are passive and have limited opportunities to actively engage in critical thinking activities (Fasha, Johar & Ikhsan, 2019; Situmorang et al., 2023).

To address these challenges, several studies have proposed using the discovery learning model to enhance students' critical mathematical thinking abilities (Edi & Rosnawati, 2021; Suwarno, Kristanti & Soemantri, 2022). Discovery learning enables students to actively explore and construct their understanding of mathematical concepts, thereby developing their critical thinking skills (Syamsu, 2020). This method encourages students to discover and explain concepts independently, fostering long-term retention of knowledge. Furthermore, it facilitates the intellectual process of generating ideas and information, making learning more meaningful and student-centered (Khotimah, Effendi & Rosyadi, 2023). Research by Putri, Anggraini & Solfitri (2023) supports this, demonstrating that discovery learning promotes active student participation and enhances comprehension.

Another effective tool to support critical thinking in mathematics is the use of Student Worksheets (LKPD). LKPD can encourage students to express their opinions, analyze problems critically, and engage actively in learning activities (Astuti, Purwoko & Indaryanti, 2017). Additionally, mathematics LKPD has been shown to help teachers guide students in understanding mathematical concepts while promoting independent learning and critical thinking (Herdiansyah, Noer & Rosidin,

2017). Therefore, developing mathematics LKPD that aligns with discovery learning principles is essential to support students' critical thinking development.

In geometry, critical thinking plays a vital role in solving problems effectively (Situmorang et al., 2023). Circle content, as a sub-topic in geometry, is particularly challenging for students and requires higher-order thinking skills (Purwasi & Fitriyana, 2020). Studies by Ernawati & Sutiarso (2020) and Hanufa, Afandi & Suratno (2021) reveal that students' critical thinking abilities in solving circle-related problems remain low. Conversely, research by Situmorang et al. (2023) and Citra & Salamanya (2019) demonstrates the positive impact of discovery learning on students' critical thinking in circle content at the junior high school level. Furthermore, integrating electronic LKPD with discovery learning principles has proven effective in enhancing students' understanding and critical thinking in circle-related problems (Putri, Anggraini & Solfitri, 2023).

Based on the aforementioned studies, this research seeks to address gaps in existing approaches by developing a mathematics teaching module in the form of discovery learning-based LKPD focused on circle content for Phase D students. This development aims to facilitate students' critical mathematical thinking skills and address the challenges faced in implementing the independent curriculum effectively.

METHODS

This study employed a development research approach (Research and Development) guided by the 4D model introduced by Thiagarajan (1976). The 4D model consists of four stages: definition, design, development, and dissemination, which systematically direct the development process to achieve reliable results.

The first stage, definition, focused on identifying and analyzing the scope of development needs. This stage involved several analyses to establish a strong foundation for the research. Front-end analysis was conducted to identify and address initial problems in the learning process, forming the basis for the study. Student analysis explored the characteristics of the target students, ensuring the development process aligned with their needs. Concept analysis was used to define the material concepts and structure learning activities based on Learning Achievements (Capaian Pembelajaran or CP). Task analysis and the specification of learning objectives were then carried out to develop the Learning Objective Flow (Alur Tujuan Pembelajaran or ATP) and specific Learning Objectives (Tujuan Pembelajaran or TP).

The second stage, design, aimed to produce an initial draft of the Student Worksheet (LKPD). This stage included the preparation of standard test instruments, such as validation sheets and student response questionnaires, to evaluate the effectiveness of the LKPD. Media and formats were selected based on the principles

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of discovery learning, and the initial LKPD prototype (Prototype 1) was created according to the established format.

In the third stage, development, the LKPD underwent refinement based on input from expert validators and feedback from students. This stage involved an expert review process, where Prototype 1 was evaluated and improved, resulting in Prototype 2. Additionally, developmental testing was conducted following Tessmer's (1993) formative evaluation model to assess the readability and usability of the LKPD. This process ensured that the final product met the required standards of validity and practicality.

The final stage, dissemination, involved packaging and distributing the LKPD for use in broader learning contexts. This stage ensured that the developed LKPD was ready for practical application in classrooms and aligned with the goals of discovery learning.

The research was conducted with 15 students from Babussalam Junior High School in Pekanbaru, who were selected to represent diverse ability levels. Data collection involved both quantitative and qualitative methods. Quantitative data were obtained from the results of validator assessments using validation questionnaires and student response data collected through practicality questionnaires. Qualitative data, on the other hand, were derived from feedback provided by validators and students regarding the use of the LKPD on circle content.

The validation process involved scoring by expert validators using a formula:

$$\overline{v_a} = \frac{\sum_{i=1}^{n} v_{ai}}{n}$$

Where $\overline{v_a}$ represents the average validation score, v_{ai} denotes the validation score for each aspect, and n is the number of validators. The validation results were interpreted based on predetermined criteria, with intervals ranging from "Very Valid" for scores between 85.01% and 100.00%, to "Invalid" for scores below 50.00%.

Practicality was assessed through student response questionnaires, using the formula:

$$\overline{v_p} = \frac{\sum_{i=1}^{n} v_{pi}}{n}$$

Where $\overline{v_p}$ represents the average practicality score, v_{pi} is the score for each aspect, and nnn is the total number of respondents. The practicality results were similarly categorized, with "Very Practical" corresponding to scores between 85.01% and 100.00%, and "Impractical" for scores below 50.00%.

Through these systematic stages, the research ensured the development of a valid and practical LKPD aligned with the principles of discovery learning to support students' critical thinking abilities in mathematics.

FINDING AND DISCUSSION

The definition stage focused on identifying and analyzing fundamental issues in the use of teaching materials, particularly LKPD, by teachers in schools. Observations at Babussalam Junior High School revealed that students were not sufficiently engaged in the learning process and encountered significant difficulties in solving problems that required critical mathematical thinking. Teachers were found to rely predominantly on printed teaching materials provided by publishers and facilitated by the school. LKPD was used only for assignment purposes, which limited its effectiveness in facilitating the concept discovery process and failed to support the development of students' critical thinking abilities. These findings align with the study by Fitri, Maimunah, and Suanto (2023), which showed that most mathematics teachers employ teacher-centered learning approaches. In such settings, teachers focus on explaining concepts, solving example problems, and assigning practice questions, resulting in students relying more on memorization than on conceptual understanding. Consequently, students lack the depth of critical thinking necessary for problem-solving. Despite this, LKPD has the potential to foster effective interactions between teachers and students, stimulating intellectual engagement and promoting critical thinking that aligns with the applied learning model.

The student analysis stage aimed to examine the characteristics of students who were the focus of the LKPD development. The students involved in this study were aged between 12 and 15 years, an age where they demonstrated the ability to understand and interpret data or procedural concepts. They also exhibited a natural curiosity to explore ideas independently. These students could clarify, examine, analyze, and organize information from problem statements, as well as devise solution strategies to determine correct answers. Additionally, they were capable of validating the accuracy of their solutions by applying appropriate methods and drawing logical conclusions based on available data. Given these characteristics, the LKPD was designed to accommodate students with diverse abilities, encouraging collaborative discussions that would allow them to build, explore, and solve problems effectively.

The concept analysis stage involved identifying the Learning Outcomes (Capaian Pembelajaran or CP) associated with the measurement elements of circle content. The primary learning outcome was defined as follows: *"Students can explain how to determine the area of a circle and solve related problems."* This analysis resulted in a structured learning activity framework spanning four sessions. The first session covered the elements of a circle, followed by a session on calculating the circumference and area of a circle. The third session explored the relationship

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between the central angle and the circumferential angle of a circle, while the final session examined the relationship between the central angle, arc length, and the area of a segment of the circle.

The task analysis and specification of learning objectives aimed to outline tasks aligned with the identified Learning Outcomes, ensuring a systematic learning process. Tasks were designed to provide opportunities for students to apply their critical thinking skills, such as analyzing problems, validating solutions, and forming conclusions. The specified learning objectives served as a structured guide for instructional activities, enabling both individual and collaborative learning experiences that would enhance the students' ability to think critically and solve mathematical problems.

This activity serves to analyze CP containing circle content, thereby creating ATP and TP. The results of this stage are presented in Table 1.

Table 1. Results of Analysis of Learning Achievements (CP)

Phase D Learning Outcomes Circle Content	They can explain how to determine the area of a circle and solve related problems
Learning objectives	Unit 1. Students can interpret, analyze, identify and conclude Unit 2. Students can interpret, analyze, evaluate and conclude solutions to problems related to the circumference and area of circles. Unit 3. Students can interpret, analyze, evaluate and conclude solutions related to the relationship between the central angle and the circumferential angle of a circle Unit 4. Students can interpret, analyze, evaluate and conclude solutions to problems related to the relationship between arc length and circle area.
Element	Measurement
Content	Circle
Total JP	8
Pancasila Student Profile	Critical reasoning, creative, working together

The design stage focused on analyzing and developing the LKPD design to ensure it met the criteria for validity and practicality. The initial step in this stage was the preparation of test standards in the form of validation and practicality instruments. The validation instrument utilized a validation sheet comprising four key assessment components: content appropriateness, language, graphics, and presentation. These components were designed to evaluate the overall quality and suitability of the LKPD. The practicality instrument, on the other hand, was a student response questionnaire adapted from the framework proposed by Edi and Rosnawati (2021). This questionnaire assessed three main aspects: ease of use, time efficiency, and

ease of interpretation, providing insights into how effectively the LKPD could be implemented in classroom settings.

Subsequently, media and software were selected to support the design and production process. Microsoft Office Word 2010 was chosen to create the LKPD, which was then printed in book format for ease of use during testing. The LKPD design was structured systematically to align with the principles of discovery learning and critical thinking development.

The LKPD format was divided into two main sections. The first section, the cover page, included student identity fields, learning objectives (TP) related to circle content, and clear instructions for completing the tasks. The second section, the main content, was structured according to the discovery learning framework, which consists of the following stages: stimulation, problem statement (problem identification), data collection, data processing, verification, and generalization (drawing conclusions). Each stage in the LKPD was designed to integrate indicators of critical thinking skills, namely interpretation, analysis, evaluation, and inference, ensuring that students could engage in meaningful cognitive processes while completing the tasks.

The outcome of the design stage was a structured LKPD format tailored to mathematics learning outcomes through the discovery learning model. This structured approach ensured that the LKPD effectively supported the achievement of learning goals while fostering critical thinking.

Table 2. Components for Preparing LKPD

LKPD section	Compilation Components
General Information	LKPD cover Foreword List of contents
Learning Activities	Cover of the front page of LKPD Title of material Student identity Learning Objectives Working Instructions Fill in the LKPD Stimulation Identify the Problem Data Collection Data Processing Verification Generalization Exercise

The final step in the design stage was to create an initial draft of the LKPD based on the analyses and descriptions from the previous steps. This process resulted in the

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production of Prototype LKPD-1. The findings from this stage align with the study by Susanti et al. (2023), which emphasized that implementing discovery learning-based LKPD offers students the opportunity to think critically and independently while honing their intellectual abilities.

In the development stage, formative evaluation was carried out to refine Prototype LKPD-1. This stage involved two key processes: expert validation and one-on-one evaluations, both of which contributed to the creation of Prototype LKPD-2. Subsequently, Prototype LKPD-2 was tested on small groups of students to develop the final product. The formative evaluation process included revisions and improvements aimed at ensuring the LKPD was suitable for use by students and teachers.

Expert validation was conducted by two mathematics education lecturers and one practitioner (a mathematics teacher). Their evaluations focused on the validity of the LKPD across four key aspects: content appropriateness, presentation, language, and graphics. The feedback provided by these validators was instrumental in revising and enhancing the LKPD to meet quality standards. Table 3 below presents the results of the LKPD validation conducted by the validators.

Table 3. Data Analysis Results for the Validity of LKPD

Assessment Aspects	Average Rating of 3 Validators on LKPD				Average
	1	2	3	4	
Content Eligibility	94,79%	98,96%	98,96%	97,91%	97,65%
Language Eligibility	88,33%	93,33%	86,66%	88,33%	89,16%
Feasibility of presentation	93,85%	98,81%	91,66%	93%	94,33%
Graphic Eligibility	95,83%	96,87%	95,83%	97,92%	96,61%
Average Validity					94,43%
Category					Very Valid

Table 3 shows that the validation scores of the three validators have an average of 94.33%, very valid criteria. This score indicates that based on the validity requirements of discovery learning-based LKPD as a whole it meets the validity aspect.

The next stage is that the LKPD is evaluated one by one with three subjects from Babussalam Middle School, Pekanbaru, whose mathematical abilities are different. Students are given LKPD to work on independently, then if students report difficulties while working on the LKPD to the researcher, such as writing words that are not well understood, instruction sentences that are difficult to understand, it becomes a useful improvement or revision for the researcher so that they can make some small improvements. After carrying out expert validation and one-on-one evaluation, prototype 2 was produced which was tested on a small group of students with the aim of obtaining data on the practicality of the LKPD. This activity involved

15 Babussalam Pekanbaru Middle School students who were grouped into 3 groups with heterogeneous abilities. After students complete and present the results of their LKPD work, students receive a practicality instrument (student response questionnaire) which must be filled out with the aim of receiving student input or comments regarding the LKPD they have worked on. Below in Table 6, the results of the assessment of the use of LKPD through student response questionnaires are presented.

Table 4. Results of LKPD Practicality Data Analysis

Assessment Aspects	Average Rating of 3 Validators on LKPD				Average
	1	2	3	4	
Ease of Use	86,66%	91,33%	91,66%	89,99%	89,91%
Time suitability aspect	84,16%	85,83%	89,16%	84,99%	86,03%
Easy to interpret	86,18%	88,09%	88,33%	89,5%	88,025%
Average Practicality					87,98%
Category					Very practical

Based on the results of the practicality analysis, the ease-of-use aspect of LKPD-1 received a slightly lower score compared to other LKPD, with a value of 86.66%. This was partly due to some students not being accustomed to working with LKPD, leading to initial difficulties in understanding how to use it effectively. The time suitability aspect of LKPD-1 also scored slightly lower, with a value of 84.16%. However, in the easy-to-interpret aspect, most students stated that learning mathematics using the LKPD was very helpful in understanding the circle content. Students appreciated the clarity of the explanations and acknowledged that the LKPD helped them comprehend the material more effectively.

Overall, students provided positive feedback, stating that the developed LKPD was supportive in learning circle content, easy to understand, and presented in an attractive format. These findings indicate that the developed LKPD meets the criteria for validity and practicality, making it appropriate for use in classroom learning. This conclusion is consistent with the findings of Susanti et al. (2023), who noted that discovery learning-based LKPD facilitates the development of critical mathematical thinking skills while being valid and practical.

The developed LKPD, after being evaluated and refined, has been packaged in a book format for use by students and teachers. This final version is ready to support effective learning activities, particularly in mathematics instruction focused on circle content. The final product of the LKPD is displayed below.

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Figure 1. View of the LKPD cover

CONCLUSIONS AND RECOMMENDATIONS

The final product of this research is a mathematics worksheet (LKPD) designed using the discovery learning model, specifically tailored for Phase D students learning circle content. The LKPD meets the criteria for validity and practicality, making it suitable for use by Phase D students. Furthermore, the LKPD demonstrates effectiveness in facilitating students' critical mathematical thinking skills. Based on the research findings, it was concluded that the LKPD achieved a very valid criterion, as evidenced by an average validity score of 94.43% from expert validation. Additionally, the LKPD was categorized as very practical, with an average practicality score of 87.98%.

This study has some limitations, as it only involved small group testing. Future researchers are encouraged to expand the scope to include large group testing to evaluate the effectiveness of the LKPD on a broader scale. Furthermore, subsequent studies could explore the development of LKPD for other educational levels or subject content, either using the discovery learning model or integrating other innovative learning models.

REFERENCES

Akbar, S. (2013). *Instrumen perangkat pembelajaran*. Bandung: PT Remaja Rosdakarya.

Astuti, P., Purwoko, P., & Indaryanti, I. (2017). Pengembangan LKS untuk melatih kemampuan berpikir kritis dalam mata pelajaran matematika di kelas VII SMP. *Jurnal Gantang, 2*(2), 145–155.

Citra, M., & Salamanya, K. (2019). Penerapan model pembelajaran penemuan (*discovery learning*) pada materi lingkaran di kelas VIII SMP Negeri 1 Tewah. *Jurnal Pendidikan, 20*(1), 67–79.

Edi, S., & Rosnawati, R. (2021). Kemampuan berpikir kritis siswa dalam pembelajaran matematika model discovery learning. *JNPM (Jurnal Nasional Pendidikan Matematika), 5*(2), 234.

Effendi, R., Herpratiwi, H., & Sutiarso, S. (2021). Pengembangan LKPD matematika berbasis *problem-based learning* di sekolah dasar. *Jurnal Basicedu, 5*(2), 920–929.

Ernawati, & Sutiarso, S. (2020). Analisis kesulitan menyelesaikan soal matematika kategori *higher order thinking skills* menurut tahapan Polya. *Jurnal Penelitian Pembelajaran Matematika, 13*(2), 178–195.

Fasha, A., Johar, R., & Ikhsan, M. (2019). Peningkatan kemampuan pemecahan masalah dan berpikir kritis matematis siswa melalui pendekatan metakognitif. *Jurnal Didaktik Matematika, 5*(2), 53–64.

Fitri, W. J., Maimunah, & Suanto, E. (2023). Analisis kemampuan berpikir kreatif matematis siswa SMP pada materi persamaan garis lurus. *Jurnal Pendidikan Tambusai, 2*(2022), 1678–1688.

Girsang, B., Simanjuntak, H., Manurung, J., & Purba, F. (2022). Analisis kemampuan berpikir kritis siswa dengan model Program for International Student Assessment (PISA) konten kuantitas pada materi himpunan di kelas VII SMP HKBP Sidorame Medan. *Sepren, 1*(4), 172–180.

Hanufa, A., Afandi, A., & Suratno, J. (2021). Analisis kemampuan berpikir kritis matematis siswa SMP Negeri 1 Kota Ternate dalam menyelesaikan soal lingkaran. *Jurnal Pendidikan Guru Matematika, 1*(2), 216–231.

Herdiansyah, K., Noer, S. H., & Rosidin, U. (2017). Pengembangan LKPD berbasis model *problem-based learning* untuk meningkatkan kemampuan berpikir kritis. *Jurnal Pendidikan Matematika, 4*(1), 9–15.

Khotimah, K., Effendi, M. M., & Rosyadi, A. A. P. (2023). Pengembangan perangkat pembelajaran berbasis discovery learning untuk meningkatkan kemampuan berpikir kritis matematis siswa SMP. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 12*(2), 2621.

Martyanti, A., & Suhartini, R. (2018). Etnomatematika: Menumbuhkan kemampuan berpikir kritis melalui budaya dan matematika. *Indomath, 1*(1), 35–41.

https://doi.org/10.30606/absis.v7i2.2588

Novalina, D. (2023). Pengaruh kurikulum merdeka belajar terhadap kemampuan berpikir kritis peserta didik kelas VII pada mata pelajaran pendidikan agama Islam di SMPN 1 Karawang Barat. *Jurnal Pendidikan Agama Islam, 6*(1), 99–113.

OECD. (2019). *What students know and can do: PISA 2018 results*. Paris: OECD Publishing. https://doi.org/10.1787/g222d18af-en

Purwasi, L. A., & Fitriyana, N. (2020). Pengembangan lembar kerja peserta didik (LKPD) berbasis *higher order thinking skills (HOTS). AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 9*(4), 894.

Putri, E., Anggraini, R. D., & Solfitri, T. (2023). Pengembangan LKPD elektronik berbasis discovery learning materi lingkaran untuk memfasilitasi KPM peserta didik SMP/MTs. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 12*(1), 951.

Situmorang, A. S., Manurung, D., Purba, F., & Nainggolan, J. (2023). Efektivitas model discovery learning terhadap kemampuan berpikir kritis matematis siswa kelas IX SMP Negeri 15 Medan pada materi lingkaran. *Sepren, 4*(2), 210–218.

Suwarno, Z., Kristanti, F., & Soemantri, S. (2022). *Meta-analisis*: Pengaruh model discovery learning. *Jurnal Derivat, 9*(2), 153–164.

Syamsu, F. D. (2020). Pengembangan lembar kerja peserta didik berorientasi pembelajaran discovery learning untuk meningkatkan keterampilan berpikir kritis siswa. *Genta Mulia, XI*(1), 65–79.

Tessmer, M. (1993). *Planning and conducting formative evaluations: Improving the quality of education and training*. London: Taylor & Francis.

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1976). *Instructional development for training teachers of exceptional children: A sourcebook*. Bloomington, IN: Indiana University Press.