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Research Article

Development of Student Worksheets Based on Higher Order Thinking Skills Based on Assessment Culture and Student's Productive Disposition

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Abstract

This research and development (R&D) study aimed to develop Higher Order Thinking Skills (HOTS)-based student worksheets (LKPD) grounded in assessment culture and productive disposition. Following the ADDIE model (Analyze, Design, Develop, Implement and Evaluate). The study involved three mathematics teacher, five students for preliminary analysis, two subject matter experts, two media experts and 25 students for implementation. Data were collected through unstructed interviews and several instrument such as an assessment culture questionnaire, a productive disposition questionnaire, expert validation sheets and user response questionnaire. Findings showed that the student's assessment was categorized as "compliance", and their productive disposition was "moderate". The worksheets were validated as "highly feasible" by experts and received "very good" user feedback. Furthermore, an 84% student mastery rate in the competency test demostrates the effectiveness of the developed HOTS based worksheet for learning.

Keywords: student's worksheet, higher order thinking skills (HOTS), assessment culture, productive disposition

INTRODUCTION

The Era of the Industrial Revolution 4.0 and Society 5.0 demands that the education system not only produces students who are cognitively intelligent but also

capable of critical, creative, communicative, and collaborative thinking (Judijanto et al., 2025). The ability to think critically, creatively, communicatively, and collaboratively is known as higher-order thinking skills (HOTS). HOTS has become one of the main focuses in the Merdeka Curriculum to address these challenges. HOTS refers to the ability to analyze, evaluate, and create (Pratama & Retnawati, 2018). HOTS forms the foundation of the 4C skill framework (Critical Thinking, Creativity, Collaboration, Communication). As explained by Prayekti in the revised Bloom's Taxonomy, higher-order thinking is the key to preparing individuals for the complexity of global problems (Prayekti, 2023). To achieve this goal, learning tools that stimulate critical and creative thinking processes are needed. One of the strategic tools for development is the Student Worksheet (LKPD). However, field data shows that the learning process is still dominated by LOTS skills. A recent study by Fahmi et al. confirms that the LKPD used in schools tends to be procedural and lacks challenges, thus failing to stimulate students' critical and creative abilities (Fahmi et al., n.d.). This creates a gap between the curriculum's expectations and the actual practices in the classroom, making the development of LKPDs specifically designed to stimulate HOTS a necessity.

The assessment paradigm used in conventional LKPDs is also typically summative, where assessment is merely a tool to measure the final results. According to Seidl, in the 21st-century framework, assessment should shift towards formative assessment (Seidl, 2024). Yan & Boud argue that embedded formative assessment within the learning process is key to fostering independent learning (Yan & Boud, 2021). In the context of LKPD, integrating assessment culture means designing activities that not only challenge HOTS but also provide space for students to reflect on their understanding, conduct self-assessments, and receive constructive feedback for continuous improvement. The concept of assessment culture from the student's perspective is crucial. This study will examine the effectiveness of HOTS-based LKPD based on assessment culture and productive disposition from the students' perspective, as students are the main actors directly affected by the learning processes and the assessment culture implemented (Ahmadi, 2022).

A common issue in schools is that the problems used in learning tend to focus on memory recall, which does not enhance students' higher-order thinking skills, leading to the perception that students' thinking skills are underdeveloped (Farihah et al., 2018). This results in suboptimal development of higher-order thinking skills in mathematics. In line with the findings of Rahayu and Chotimah, students still face difficulties when solving HOTS-based problems (Rahayu & Chotimah, 2021). The study revealed that none of the students received an excellent rating for their HOTS abilities, with most of them being categorized as average, accounting for 65%.

Additionally, an interview conducted with a teacher at SMPN 1 Cipaku revealed that assessments commonly used in the school are tests and quizzes. Only a small number of students are able to solve HOTS-based problems from the learning materials available at the school. The use of test instruments is also limited to the available resources in the school, which hinders students from showcasing their best abilities, as well as the need to keep up with the times to shape independent, logical, critical, and creative students.

The development of HOTS-based LKPD has often focused solely on content and cognitive aspects, without considering the affective aspects and students' perceptions of the learning process itself. Such LKPDs often present challenging problems without building a learning environment that allows students to feel safe and motivated in facing those challenges. As a result, students may experience frustration and math anxiety when forced to "think at a higher level" without adequate psychological and pedagogical support. The relationship between cognitive and affective domains in mathematics learning is deeply intertwined, as reinforced by Lau in the International Journal of Science and Mathematics Education, which emphasizes that students' beliefs about mathematics significantly predict their problem-solving abilities and conceptual understanding (Lau, 2022). Students with a growth mindset tend to be more resilient when facing complex problems, ultimately leading to higher cognitive achievements. The ability and success of mathematics learning among students are influenced by various factors, one of which is the students' perspective on the learning process and assessment, as well as their overall view of mathematics (Tae et al., 2019).

Students' perspective on mathematics is closely related to their views on assessment in mathematics and learning. The assessment that takes place in schools and is implemented by all school members is known as the assessment culture (Adie et al., 2021). Assessment culture influences how students and teachers respond, how they handle and overcome challenges in assessments. Thus, students' awareness during assessments is crucial, as their perceptions of assessments play a significant role. For instance, students who regard assessments as an essential part of the learning process or those who consciously aim to improve their abilities will tend to exert more effort in completing the assessments given by the teacher (Pollock & Tolone, 2020). According to Sokhanvar et al., if students have adequate knowledge about the purpose of assessments, it will benefit them in engaging in more in-depth learning (Sokhanvar et al., 2021). Moreover, it allows them to assess the quality of their performance in assessments and take more initiative in their learning.

Therefore, students' perspective on the assessment culture they face plays a crucial role. Cheah et al. categorize students' perspectives on assessment culture into three categories: culture of learning, culture of compliance, and culture of fear (Cheah et al., 2018). These categories describe students' fundamental beliefs about the purpose of assessments and how they emotionally and behaviorally respond to them.

The culture of fear arises when assessments are used punitively, such as through humiliating ranking systems or punishments for mistakes, which leads to math anxiety and hinders students' readiness to take risks in learning (Ramirez et al., 2018). The most detrimental aspect of a culture of fear is when students experience psychological pressure due to the fear of punishment or humiliation for mistakes. They avoid challenges, hesitate to ask questions, and even develop anxiety toward mathematics. In such an environment, grades become a source of stress rather than a reflection of learning.

The culture of compliance emphasizes achieving external standards through standardized tests, where students are expected to follow prescribed problem-solving methods with no room for creativity. This often leads to rote learning and lack of

meaningful engagement. In a culture of compliance, students focus on "following the rules" and memorizing formulas without understanding their meaning. They feel constrained by rigid teaching methods and are afraid to deviate from the prescribed approaches, even if they have creative solutions. Assessments, such as standardized exams, make them study only to achieve good grades rather than to master the material.

The culture of learning focuses on the development of deep understanding through formative assessments that provide constructive feedback, encourage exploration of various problem-solving strategies, and view mistakes as an integral part of the learning process. For example, a teacher facilitating group discussions to collaboratively explore mathematical concepts. In a culture of learning, students feel supported in understanding mathematical concepts deeply. They view assignments and exams as opportunities to grow, as teachers provide constructive feedback and encourage exploring various ways of solving problems. Mistakes are seen as part of the learning process, which builds confidence and intrinsic motivation.

Moreover, students' view of mathematics, often referred to as productive disposition, is also a critical factor in their success in learning mathematics (Syahputra, 2024). Productive disposition refers to students' ability to view mathematics as meaningful, valuable, logical, and useful in life (Awofala et al., 2022; Stylianides & Hino, 2018). There are seven indicators in productive disposition, namely: (1) confidence in solving mathematical problems; (2) flexibility in exploring mathematical ideas and trying alternative methods to solve problems; (3) strong determination to complete mathematical tasks; (4) interest, curiosity, and the ability to discover while working on mathematics; (5) tendency to monitor and reflect on their thinking process and performance; (6) evaluating the application of mathematics in other fields of everyday life; (7) appreciation for the role of mathematics.

Productive disposition is closely related to students' enjoyment, motivation, and self-acceptance in mathematics learning. In other words, productive disposition is linked to students' positive attitudes toward learning. These positive feelings contribute to academic achievement. Negative feelings, however, can become barriers for students (Budiarti, 2018). However, some students need to improve their productive disposition. This is evident when a majority of students perceive mathematics as a difficult subject, leading many to avoid it. Students often feel discouraged when faced with challenging problems, lacking engagement, curiosity, and persistence in solving mathematical problems (DiNapoli, 2018; Pradiarti et al., 2024).

Based on the above, this study is conducted to develop HOTS-based Student Worksheets (LKPD) grounded in Assessment Culture and Productive Disposition from the students' perspective. This development is expected to produce learning tools that not only stimulate higher-order thinking skills but also create a supportive and empowering learning environment, enabling students to develop both cognitive and affective competencies simultaneously.

METHODS

This study aims to produce a HOTS-based Student Worksheet (LKPD) based on assessment culture from the students' perspective and students' productive disposition for seventh-grade students. This research is categorized as Research and Development (R&D). The development research method used in this study refers to the ADDIE model, which consists of analysis, design, development, implementation, and evaluation.

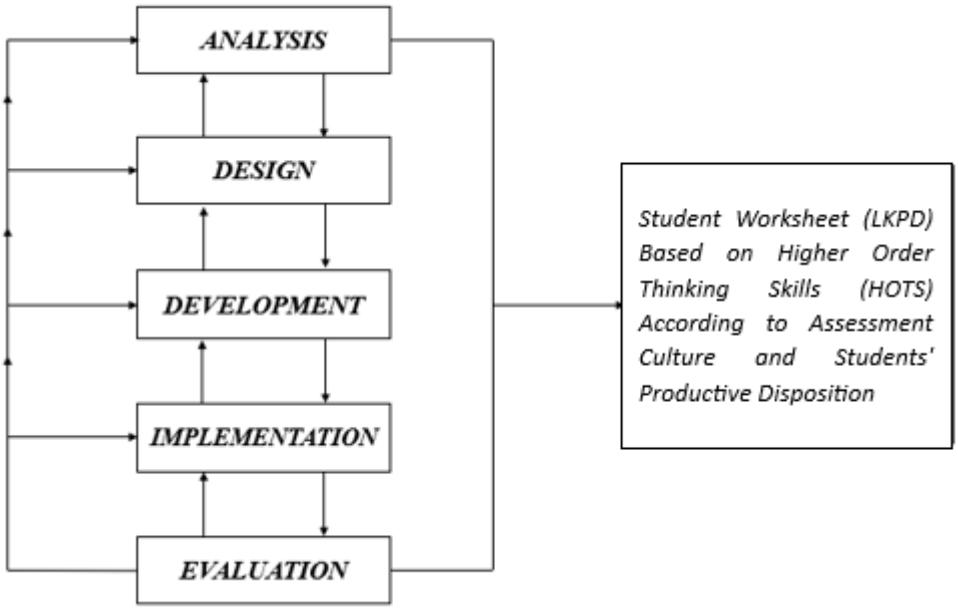


Figure 1. Research Procedure Used

The subjects of the HOTS-based LKPD development research on algebra material were 25 seventh-grade students from SMPN 1 Cipaku. Data collection in this study involved interviews, validation sheets, assessment culture questionnaires from the students' perspective, productive disposition questionnaires, and user response questionnaires. The analysis phase carried out by the researcher involved identifying a problem that was a school need. Through unstructured interviews and the distribution of questionnaires, data was obtained regarding the need for integrated learning between cognitive and affective aspects. The data analysis techniques used in this study included analyzing the results of the assessment culture questionnaires from the students' perspective, the students' productive disposition questionnaires, expert validation sheet analysis, and user response questionnaire analysis. Afterward, the effectiveness of the developed HOTS-based LKPD was calculated.

RESULT AND DISSCUSSION

The results obtained in this study are a HOTS-based Student Worksheet (LKPD) based on assessment culture from the students' perspective and productive disposition on algebra material. The steps of this research are adapted from the ADDIE model (Suratnu, 2023). The ADDIE model consists of five stages: (1) Analysis: In this stage, the researcher conducts an analysis by analyzing needs, students, facts,

concepts, principles, and procedures of the learning material; analyzing learning objectives; analyzing the assessment culture from the students' perspective; and analyzing productive disposition. Data was obtained through unstructured interviews and questionnaires. The questionnaires used include the assessment culture questionnaire from the students' perspective and the productive disposition questionnaire.

Table 1. Results of the Assessment Culture Questionnaire from the Students' Perspective

Many Subjects	Category	Percentage
23	Culture of compliance	92%
2	Culture of learning	8%

The results of the assessment culture from the students' perspective fall into the "culture of compliance" category, which means adherence to rules, procedures, and standards. This reflects the students' perspective on the assessment culture at their school, which is limited to following school rules and teacher instructions, without fully realizing the importance of assessment for their own development.

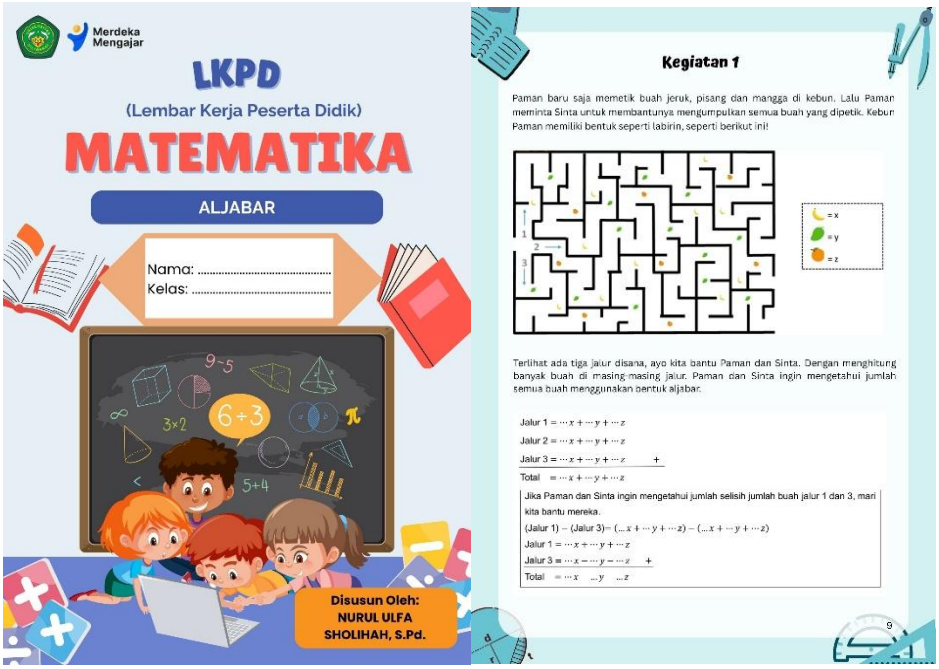
Table 2. Results of the Productive Disposition Questionnaire

Many Subjects	Category	Percentage
2	High	8%
20	Moderate	80%
3	Low	12%

The results of the productive disposition questionnaire indicate an average score of "47," which places the students in the "moderate" category.

(2) Design: In this stage, the preparation of reference sources is done, followed by the creation of the product design and instrument design. The data obtained during the analysis stage is then used as a reference to create the LKPD, which aligns with the cognitive and affective development of students. Relevant references are used to then design the product and the instruments to test the developed HOTS-based LKPD.

(3) Develop: In this stage, the researcher implements the model design, which is then validated by content experts and media experts.



The assessment by content and media experts is conducted to measure the feasibility of the HOTS-based LKPD before it is used in a limited field trial. Before it can be used, the HOTS-based LKPD undergoes several revisions regarding design, language, and material depth before it is considered appropriate for use. Once the media and content experts categorize the HOTS-based LKPD as "very feasible," a small-scale trial is conducted with five students and three mathematics teachers. The results of the questionnaires from both the mathematics teachers and the students in the small-scale trial were positive, with ratings of “very good” at 84% and 85.20%, respectively.

(4) Implementation: After completing the development stage, the HOTS-based LKPD is implemented with 25 seventh-grade students using algebra material. The sessions utilizing the HOTS-based LKPD, based on assessment culture from the students’ perspective and productive disposition, were conducted across four meetings.

(5) Evaluate: In this stage, students were asked to complete a user response questionnaire. The results of the user response questionnaire showed a percentage of 84.56%, with the rating in the "very good" category. This indicates that students' responses to the HOTS-based LKPD, based on assessment culture and productive disposition on algebra material, were positive. To determine the effectiveness of the HOTS-based LKPD based on assessment culture and productive disposition, students completed a competency test provided at the end of the developed LKPD.

Table 3. Effectiveness of the HOTS-based LKPD Based on Assessment Culture and Productive Disposition

Many Subjects	Category	Percentage
21	Completed	84%
4	Incomplete	16%

The table above shows that the completion percentage reached 84%, with a "high" learning outcome level. Therefore, it can be concluded that the developed LKPD is effective for use.

CONCLUSION

The assessment culture from the students' perspective, on average, falls into the "compliance" category. Specifically, 2 students were categorized under "improved learning," and 23 students were categorized under "compliance." The students' productive disposition, on average, falls under the "moderate" category. Of these, 2 students were categorized as having a "high" productive disposition, 20 students were categorized as having a "moderate" productive disposition, and 3 students were categorized under "low" productive disposition.

This study resulted in the development of a HOTS-based Student Worksheet (LKPD) based on the students' assessment culture, using the ADDIE model, which was carried out in five stages: (1) Analyze, where it was found that in the mathematics learning process, only the main textbook provided by the school was used, and the problems primarily came from a single source. Algebra was considered one of the more challenging topics due to its relation to mathematical modeling. (2) Design, where the researcher gathered all the supporting references for designing the product and created the model design, including what would be included in the HOTS-based LKPD to be developed, as well as designing various expert validation instruments and user response questionnaires. (3) Develop, where the researcher produced the designed product, then conducted validation with subject matter and media experts to ensure the product was valid and suitable for use. A small-scale trial was conducted with 5 students outside of class VII A, receiving responses categorized as "very good." (4) Implement, where the HOTS-based LKPD, based on the assessment culture and students' productive disposition, was implemented in teaching 25 seventh-grade students, yielding responses categorized as "very good." (5) Evaluate, where it was determined that the HOTS-based LKPD, based on assessment culture and productive disposition, was effective for use, with a learning outcome completion rate of 84%.

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