

Development of Learning Materials Based on Higher Order Thinking Skills (HOTS) in The Makeup Room Decoration Course

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ABSTRACT

The 21st century learning paradigm emphasizes the development of Higher Order Thinking Skills (HOTS) to prepare learners with essential competencies such as critical thinking, problem-solving, decision-making, and creativity. This study developed HOTS-based learning materials for the Makeup Room Decoration course using the Problem-Based Learning (PBL) model with a Case Method (CM) and the Project-Based Learning (PjBL) model with a Team-Based Project (TBP) approach. The research employed Thiagarajan's 4-D model, consisting of four stages: define, design, develop, and disseminate. The developed products included a Semester Learning Plan (RPS), an e-book with video tutorials, and a HOTS test instrument. The research trials were conducted in three stages-expert validation, limited trials, and field trials-involving experts, lecturers, and students. Data were collected using observation sheets, validation forms, assessment questionnaires, and tests. The results indicated that the developed learning materials met the criteria for validity, practicality, and effectiveness. The RPS was categorized as highly valid (Aiken's $V = 0.8375$), the e-book as moderately valid ($V = 0.723$ by learning design experts and $V = 0.823$ by media experts), and the HOTS test instrument as highly valid ($V = 0.937$). The limited trials showed that the materials were very practical, while field trials demonstrated effectiveness with an average student achievement rate of 81.7%. These findings confirm that the developed learning materials are feasible and effective in enhancing students' higher-order thinking skills in the Makeup Room Decoration course of the Beauty Education Program at the State University of Medan.

Keywords: *learning materials, HOTS, makeup room decoration*

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INTRODUCTION

Learning is a structured process through which students interact with their environment to acquire knowledge, develop skills, and shape attitudes. In this process, educators serve as facilitators who design, guide, and assess learning activities to help students achieve the intended outcomes. To ensure effective learning, teaching materials must be aligned with curriculum objectives and designed to stimulate students' active participation and higher-level thinking.

Teaching materials encompass a wide range of instructional resources-textbooks, lesson plans, e-modules, video tutorials, and assessment instruments-that support both teachers and learners in achieving competency-based education goals. In the 21st century, education must prepare students to adapt to rapid technological change and global challenges. As emphasized by Hasratuddin (2013), Istianah (2013), and Suparman (2015) in Agusta (2021), learning in the era of the Fourth Industrial Revolution must promote critical thinking, creativity, communication, collaboration, innovation, and lifelong learning-skills that are encapsulated in the concept of Higher Order Thinking Skills (HOTS). This aligns with the Indonesian government's policy on integrating HOTS and character education across all levels of education.

The concept of HOTS was first introduced by Bloom (1956) in his taxonomy of cognitive domains. It represents a higher level of cognition involving analysis, evaluation, and creation, where learners synthesize and apply knowledge in new contexts. HOTS involve reasoning, abstraction, and problem-solving (Frausel et al., 2020). Sani (2019) defines HOTS as the ability to think critically, logically, reflectively,

metacognitively, and creatively, while Thomas and Thorne (in Nugroho, 2018) describe it as the capacity to go beyond memorization and procedural tasks. In essence, HOTS enable learners to generate ideas, evaluate solutions, and create innovative outcomes-abilities that are essential in modern education.

Developing students' HOTS requires teaching strategies that encourage inquiry, creativity, and problem-solving. Research shows that well-designed learning plans can significantly improve higher-order thinking (Ayu et al., 2022; Saragih & Nasution, 2019). In higher education, HOTS-oriented learning should be reflected in three main aspects: planning, implementation, and evaluation (Fanny et al., 2019; Mahanani et al., 2021). Among the instructional approaches proven effective are Problem-Based Learning (PBL) and Project-Based Learning (PjBL). The PBL model encourages students to explore real-world problems through investigation and reasoning (Maryati et al., 2024), while the PjBL model develops creativity and collaboration through project execution (Asror et al., 2023).

However, several studies indicate that many educators still face challenges in developing and implementing HOTS-based materials. Hartini et al. (2021) found that teachers often design assessments that measure only lower-order thinking skills (LOTS), particularly at the higher cognitive levels (C4-C6). Kamilati (2018) also noted limited mastery of operational verbs and curriculum analysis, resulting in incomplete HOTS integration. Additionally, Arum et al. (2022) and Dalimunthe et al. (2020) demonstrated that HOTS-based instruments and textbooks can significantly improve learning quality when designed with validity and feasibility in mind.

The *Makeup Room Decoration* course in the Beauty Education Study Program at the State University of Medan is a practical course that emphasizes creativity and aesthetics in designing decorations for various events such as weddings, engagements, and birthdays. Despite its potential to foster creativity, observations revealed that the existing Semester Learning Plan (RPS) remains focused on LOTS, the learning resources are not HOTS-based, and the assessments are limited to practical simulations. This condition highlights the need for learning materials that not only support practical skills but also enhance students' higher-order thinking.

Therefore, this study aims to develop, validate, and evaluate learning materials based on Higher Order Thinking Skills (HOTS) for the *Makeup Room Decoration* course. Specifically, this research focuses on determining the validity, practicality, and effectiveness of the developed learning materials to enhance students' higher-order thinking skills in vocational education.

METHOD

Research Design

This study employed a Research and Development (R&D) approach aiming to produce learning materials based on Higher Order Thinking Skills (HOTS) for the *Makeup Room Decoration* course. The developed products included: (1) a Semester Learning Plan (RPS), (2) an e-book integrated with video tutorials, and (3) a HOTS-based assessment instrument in the form of an essay test. Define – identifying problems and determining alternative solutions in the *Makeup Room Decoration* course, analyzing student characteristics and academic abilities, selecting relevant materials, and defining indicators for Course Learning Outcomes (CLOs).

Development Model

The research followed the 4-D model developed by Thiagarajan, Semmel, and Semmel, consisting of four stages:

1. Define – identifying problems and determining alternative solutions in the *Makeup Room Decoration* course, analyzing student characteristics and academic abilities, selecting relevant materials, and defining indicators for Course Learning Outcomes (CLOs).

2. Design – creating the initial design of the RPS, e-book, and test instrument based on the results of the analysis.
3. Develop – conducting expert validation, limited trials, and field trials to assess the validity, practicality, and effectiveness of the developed materials.
4. Disseminate – submitting the final product to the study program and university, as well as disseminating it through scientific publication.

Participants and Research Setting

The study was conducted during the odd semester of the 2023 academic year in the Beauty Education Study Program at the State University of Medan. Participants included experts, lecturers, and students from the 2022 cohorts of Classes A and B. A total of 65 students participated in the field trials, while two lecturers and ten students were involved in the limited trials.

Data Collection Instruments

Data were collected using both test and non-test instruments. The test instrument measured students' HOTS through descriptive essay tests. The non-test instruments consisted of validation sheets, lecturer and student assessment forms, and observation sheets.

Data Analysis Techniques

Validity Analysis

The validity of the RPS, e-book, and HOTS test instrument was analyzed using Aiken's V coefficient. A product was considered valid if its average score fell within the valid category.

Practicality Analysis

Practicality was analyzed based on lecturers' and students' assessments of the usability, clarity, and relevance of the developed materials. The total scores were converted into percentages using the formula:

$$\text{Practicality} = \frac{\text{Total Score}}{\text{Maximum Possible Score}} \times 100\%$$

The interpretation criteria were adapted as follows:

Table 1. Interpretation Criteria

Percentage	Category
81–100%	Very Practical
61–80%	Practical
41–60%	Fairly Practical
21–40%	Less Practical
≤20%	Impractical

Effectiveness Analysis (*revised*)

Effectiveness was measured through the average score obtained by students in the descriptive HOTS test. Learning materials were considered effective if the average class score was between 66-79 (Effective) and 80-100 (Highly Effective). This criterion was adapted from the Unimed Rector Regulation No. 004 of 2022 regarding learning achievement standards.

RESULTS AND DISCUSSION

Validity Test

The validation results show that all developed learning materials met the validity requirements according to expert judgment. The Semester Learning Plan (RPS) achieved an Aiken's V score of 0.8375, categorized as *Very Valid*. The e-book validation by design and media experts obtained Aiken's V scores of 0.723 and 0.771, respectively, categorized as *Moderately Valid*. Meanwhile, the HOTS test instrument reached a V score of 0.937, indicating a *Very High Validity Level*. The validation results for the Semester Learning Plan (RPS) are shown in Table 2.

Table 2. Validation Results of the Semester Learning Plan (RPS)

Aspect	Aiken Index	Validity Criteria
Course Identity	1.00	Very Valid
Course Learning Outcomes (CLOs)	0.875	Very Valid
Sub-CLOs	0.75	Fairly Valid
HOTS Indicators	0.75	Fairly Valid
Material Suitability	1.00	Very Valid
Learning Model	0.75	Fairly Valid
Learning Activities	0.625	Fairly Valid
Language Accuracy	0.625	Fairly Valid
References	0.75	Fairly Valid
Assessment of Learning Outcomes	0.625	Fairly Valid
Average	0.8375	Very Valid

The results indicate that the RPS meets the very valid criteria overall, with high internal consistency among its components.

Table 3. Validation by Learning Design Experts

Aspect	Aiken Index	Validity Criteria
Objective	1.00	Very Valid
Strategy	0.625–0.875	Fairly–Very Valid
Evaluation	0.50–0.75	Fairly Valid
Average	0.723	Fairly Valid

Table 4. Validation by Learning Media Experts

Aspect	Aiken Index	Validity Criteria
Technical	0.625–1.00	Fairly–Very Valid
Cover Design	0.625–1.00	Fairly–Very Valid
Content Design	0.625–0.875	Fairly Valid
Average	0.771	Fairly Valid

Table 5. Validation Results of HOTS Test Instrument

Aspect	Average Expert Score	Percentage	Validity Criteria
Indicator Compliance	40	100%	Very Valid
Question Clarity	36–34	93.7%	Very Valid
Overall	75 (0.937)	93.7%	Very Valid

In particular, the HOTS test instrument demonstrated strong indicator alignment, as described below. The “Indicator Compliance” aspect achieved a total score of 40 out of 40 possible points (100%), while “Question Clarity” obtained 36–34 out of 40 (93.7%), both classified as *Very Valid*. Although several RPS components—such as Sub-CLOs, HOTS indicators, and learning activities—were initially rated as *Fairly Valid*, these sections were revised based on expert feedback to ensure better alignment between learning outcomes and instructional activities.

Practicality Test

After expert validation, the materials were tested through limited trials involving two lecturers and ten students. Practicality scores were calculated using the following formula:

$$Practicality = \frac{Total\ Score}{Maximum\ Possible\ Score} \times 100\%$$

Table 6. Lecturer Assessment Results

Component	Average Score	Percentage	Criteria
RPS	43.5	87%	Very Practical
E-book	43	86%	Very Practical
HOTS Test Instrument	42	84%	Very Practical

Table 7. Student Assessment Results

Component	Max Score	Average Score	Percentage	Criteria
E-book	40	34.7	86.7%	Very Practical
HOTS Test Instrument	45	38.5	85.5%	Very Practical

Based on the analysis, the results are summarized as follows:

1. Lecturer assessments: RPS = 87% (Very Practical), E-book = 86% (Very Practical), HOTS test instrument = 84% (Very Practical).
2. Student assessments: E-book = 86.7% (Very Practical), HOTS test instrument = 85.5% (Very Practical).

These results indicate that the developed materials are highly practical, easy to use, and well-structured to support both classroom and independent learning. Respondents agreed that the layout, instructions, and media components were clear and relevant to the course objectives.

Effectiveness Test

The final product (draft 3) was tested in field trials involving 65 students. The learning implementation consisted of seven sessions, followed by a descriptive HOTS test in the eighth session. Effectiveness was measured using the *average class achievement score* from the HOTS test.

Table 8. Field Trial Results

Aspect	Number of Students	Max Score	Total Score	Average	Percentage	Criteria
Descriptive Test (1–5)	65	6500	5310	81.7	81.7%	Very Effective

The total score obtained was 5 310 out of a maximum 6 500, resulting in a class mean of 81.7%. Based on the effectiveness classification (80–100% = Very Effective; 66–79% = Effective; 56–65% = Fairly Effective; 40–55% = Less Effective; < 40% = Ineffective), the materials are categorized as Very Effective. This result indicates that the HOTS-based learning materials significantly improved students' analytical and creative thinking skills in the *Makeup Room Decoration* course.

Discussion

The findings of this study reaffirm that the development of learning materials based on Higher Order Thinking Skills (HOTS) plays an essential role in enhancing the quality of vocational education. The results clearly demonstrate that the materials developed for the *Makeup Room Decoration* course meet the three key indicators of high-quality learning product development-validity, practicality, and effectiveness-as stated by Nieveen (1999). The alignment between the methodological framework and the reported outcomes ensures that the conclusions drawn are both consistent and credible.

Validity Dimension

The validation process confirmed that all developed materials possessed strong theoretical and empirical validity. The RPS and HOTS test instrument achieved *very high validity* (Aiken's $V = 0.8375$ and 0.937 , respectively), reflecting solid alignment between the instructional objectives, learning content, and assessment criteria. These results indicate that the materials successfully captured the essential elements of HOTS-analysis, evaluation, and creation-as proposed by Bloom (1956).

Although certain components of the RPS, such as Sub-CLOs, learning indicators, and activity design, were initially rated as *fairly valid*, these were subsequently revised to ensure greater coherence between outcomes and activities. This iterative validation process, as emphasized by Retnawati (2016), is fundamental to improving the precision and reliability of educational instruments.

The e-book's *moderate validity level* ($V = 0.723$ - 0.771) primarily stemmed from technical and visual design aspects rather than conceptual weakness. Following expert recommendations, improvements were made to layout consistency, font readability, and color contrast, which enhanced overall usability. Dalimunthe et al. (2020) note that effective digital materials require a balance between instructional content and aesthetic appeal, as both elements influence learner motivation and comprehension. Thus, even with moderate validity, the revised e-book remains pedagogically sound and functionally effective.

Practicality Dimension

The practicality test results, with lecturer and student ratings above 84%, show that the developed learning materials are both user-friendly and pedagogically appropriate. The simplification of the practicality analysis using a percentage-based formula improved transparency and resolved inconsistencies in the earlier

methodology. Lecturers appreciated the clear organization of the RPS and the logical flow of topics, while students responded positively to the integration of tutorial videos and step-by-step guides within the e-book.

These findings are in line with Mahanani et al. (2021), who stated that practical learning materials allow teachers to focus on facilitating rather than constantly modifying resources. Furthermore, the use of multimedia elements strengthened the connection between theory and practice-an essential aspect of vocational learning that prioritizes skill mastery alongside conceptual understanding. As Suparman and Husen (2015) argue, combining visual, auditory, and kinesthetic learning channels through video-based instruction enhances both motivation and performance in technical courses.

Effectiveness Dimension

The field trial results revealed an average student achievement score of 81.7%, placing the materials in the *Very Effective* category. This consistent performance validates the effectiveness of integrating HOTS with Problem-Based Learning (PBL) and Project-Based Learning (PjBL) models. The two models complement each other: PBL develops analytical and evaluative reasoning through inquiry and reflection (Maryati et al., 2024), while PjBL fosters creativity, collaboration, and innovation through hands-on project execution (Asror et al., 2023).

Analysis of the descriptive HOTS test results indicates that students demonstrated the highest competency in the analysis and creation domains. This finding implies that the contextual, project-based assignments-such as designing room decorations for actual event cases-enabled students to connect conceptual knowledge with practical problem-solving. This aligns with Sani (2019), who argues that HOTS-based learning allows students to go beyond procedural skills and engage in decision-making and design thinking.

Furthermore, the integration of digital materials, including video tutorials and interactive e-book components, encouraged self-directed learning and flexibility. Ayu et al. (2022) highlight that the inclusion of technology in instruction promotes learner autonomy, digital literacy, and perseverance-all of which are critical in the Society 5.0 era. In this study, digital integration not only facilitated independent learning but also expanded access to learning resources beyond the classroom.

Reflection and Broader Implications

The overall results reinforce that HOTS-based learning materials are not merely instructional tools but strategic innovations that elevate the cognitive depth of vocational education. By combining theoretical, procedural, and reflective components, the materials cultivate higher levels of thinking that are essential in creative industries such as beauty and fashion design.

In the context of the *Makeup Room Decoration* course, the development of these materials addresses a long-standing challenge: how to move beyond imitation-based learning toward design-oriented and analytical learning. The successful implementation of HOTS-based materials suggests that vocational students are capable of engaging in critical inquiry and innovation when guided by structured yet flexible learning resources.

This study also demonstrates the importance of consistency between methodology and reporting. The alignment of metrics-using class mean scores for effectiveness and percentage conversions for practicality-enhances the transparency and reliability of findings. As emphasized by Nieveen (1999), methodological coherence is vital for validating the overall quality of educational products.

Limitations and Recommendations

Despite the positive outcomes, this research has several limitations. The study was limited to one department and one academic year, which restricts the generalizability of the findings. Future studies should involve multiple programs or institutions to examine the scalability of HOTS-based materials across diverse

vocational disciplines. Additionally, while this research used class averages to determine effectiveness, subsequent studies could include an analysis of score distributions to identify the proportion of students achieving scores ≥ 75 . This would provide deeper insight into the spread of achievement and the effectiveness of the materials across various student performance levels.

Further development is also recommended in the area of digital interactivity. The inclusion of quizzes, feedback modules, or gamified elements could make the e-book more engaging and adaptable to students' learning styles. By incorporating these enhancements, future HOTS-based materials can become not only effective in cognitive terms but also appealing, adaptive, and sustainable for long-term use in higher education.

CONCLUSIONS AND RECOMMENDATION

This study successfully developed learning materials based on Higher Order Thinking Skills (HOTS) for the *Makeup Room Decoration* course in the Beauty Education Study Program at the State University of Medan. The development process employed the 4-D model-Define, Design, Develop, and Disseminate-which produced three integrated instructional products: (1) a Semester Learning Plan (RPS), (2) an e-book combined with video tutorials, and (3) a HOTS-based descriptive test instrument.

The results revealed that all developed materials met the essential quality criteria of validity, practicality, and effectiveness. a) The RPS and HOTS test instrument achieved *very high validity* (Aiken's $V = 0.8375$ and 0.937 , respectively), while the e-book showed *moderate validity* ($V = 0.723-0.771$) but remained pedagogically feasible after revisions. b) Both lecturers and students evaluated the materials as *very practical*, with average ratings exceeding 84%, confirming their ease of use, clarity, and relevance to learning objectives. c) The effectiveness test yielded an average student achievement score of 81.7%, which falls under the *very effective* category (80-100%).

These findings confirm that the developed learning materials are feasible, reliable, and effective in enhancing students' higher-order thinking skills. Integrating HOTS-oriented strategies with Problem-Based Learning (PBL) and Project-Based Learning (PjBL) models effectively fostered analytical, evaluative, and creative thinking abilities. Students not only improved their conceptual understanding but also developed essential vocational competencies such as critical decision-making, teamwork, and innovation-skills vital for success in creative industries. From a practical standpoint, the developed HOTS-based materials can serve as a model reference for educators in other vocational and higher education contexts. The systematic structure of the RPS, the interactivity of the e-book, and the contextualized assessment instruments offer a comprehensive approach to promoting higher-level cognitive engagement in applied learning environments.

Recommendations

1. Implementation and Dissemination: The developed materials should be implemented widely across similar vocational programs to evaluate their adaptability and impact in various institutional settings.
2. Future Research: Further studies should expand the research population and examine the long-term influence of HOTS-based learning on students' performance and creativity. Incorporating pretest-posttest or quasi-experimental designs would provide stronger empirical evidence of effectiveness.
3. Digital Innovation: Future development can include more interactive digital elements such as feedback features, multimedia quizzes, or gamification to enhance learner engagement and independent study habits.
4. Professional Development: Educators should receive training on designing and applying HOTS-oriented instructional models to ensure consistent and meaningful classroom implementation.

By aligning theoretical constructs with practical application, this research contributes to advancing vocational pedagogy that not only prioritizes technical skills but also cultivates *critical, creative, and reflective thinkers* prepared for the dynamic challenges of the 21st century.

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