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Development of a High-Level Thinking Skills Test (HOTS) in English Writing

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Abstract

Written inquiries, which are more frequent and have less of a focus on complex thinking, are issues at school. Students are not taught how to respond to questions found in High-Level Thinking Skills (HOTS) tests, hence, their thinking abilities are generally weak. The issue for teachers is that neither they nor anyone else has been able to create evaluation tools for written HOTS. Therefore, the HOTS assessment instrument needs to be created. The goal of this study was to develop a written test instrument based on English material using the HOTS concept. The research and development (R&D) method was used to conduct an explorative and descriptive research using the five-stage Plomp model. The participants in this study were Senior High School Madani Alauddin Pao-Pao graduates from the 10th batch. The data was collected through documentation, interview guides, testing, and checklists for validation. Reading/remembering, describing, and categorizing were used as three qualitative data steps in the data analysis process. The validity, item analysis, reliability, difficulty, and clarity of the quantitative data were all examined by experts. The findings demonstrated that the test tool was highly valid, with an average HOTS test instrument score of 3.7. As a suggestion, teachers, educators, practitioners, and lecturers can use the HOTS test appropriately according to students' development to develop high-level thinking abilities in English writing.

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Keywords: Assessment, English Writing, Higher Order Thinking Skill (HOTS), Test Instrument.

Introduction

The Republic of Indonesia's Ministry of Education and Culture released the 2013 revision of the curriculum (K13), which included a number of modifications (Setiawan & Suwandi, 2022). These improvements included reducing irrelevant content in standardized material to promote critical thinking among students, changing the context and assessment standards, and implementing an assessment system that focused on student learning outcomes to gauge higher-order thinking skills (HOTS) (Faradella, 2022). This 2013 curriculum, which is still being used in many schools, aspired to give students the qualities and abilities necessary to become self-assured, successful, inventive, and influential members of both Indonesian society and global civilization (Palupi, 2018). This curriculum also addressed student success gaps, particularly in the areas of comprehending complicated material, grasping theoretical concepts, and problem-solving.

However, despite sustained initiatives of educational reforms, the problems in the Indonesian schools have continued to rise, worsened by the inexperienced teachers, that are less trained for high-level reasoning. Additionally, the problem for teachers aggravates as they have not been able to develop HOTS assessment tools,

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and there are no assessment tools specifically designed to teach written HOTS (Abkary & Purnawarman, 2020; Pratiwi et al., 2019). Students' thinking skills are also relatively weak because they too have not been trained to solve questions that measure HOTS (Aeni & Khairuddin, 2022; Yudha, 2023).

Writing is a communication skill that must be actively learned, and its importance should not be underestimated (Bui, 2021; Zhang et al., 2023). A solid understanding of grammar rules is essential for acquiring writing skills, since words cannot be used effectively in sentences and paragraphs without understanding how they are put together (Zhang et al., 2023). Grammatical structure refers to the way sentences are written, which the English learners often confuse, making it difficult to convey the intended message. Additionally, dealing with written English, especially regarding sentence structure, can be overwhelming without a thorough understanding of the proper form. Therefore, it is important for students to prioritize understanding and applying the rules to form grammatically correct sentences (Zhang et al., 2023).

Any language curriculum covers four language skills: reading, writing, listening, and speaking. The current study refers to the writing skills in the light of HOTS-based question-making educational materials (Sihotang et al., 2021). A curriculum on writing skills, which is more frequent and has less of a focus on complex thinking, is more significant, because it has not been taught how to respond to questions that gauge HOTS; therefore, students' thinking abilities are still generally weak. The issue for teachers is that neither they nor anyone else has been able to create evaluation tools for written HOTS. Therefore, the HOTS assessment instrument needs to be created. The goal of this study was to develop a written test instrument based on English material using the HOTS concept. Such a written test instrument will not only improve their thinking skills by using concept-based HOTS test kits but will also develop a more generalized English-language material-based HOTS concept test instrument for a wider usage.

Literature Review

Previous studies have viewed student curriculum goals from an educational perspective, highlighting higher-order thinking skills (HOTS) (Warmadewi et al., 2019). The HOTS is a higher level of thinking than memorizing or repeating information. The fundamental skill that can be developed in the classroom is the ability to think, which will enable all students to achieve their goals (Hamzah et al., 2022). The students are faced with a problem that needs to be addressed. Thinking is a type of mental activity experienced by a person. In addition, higher-order reasoning skills include rational, introspective, metacognitive, and creative thinking (Loyens et al., 2023). All of these skills come into play when students are faced with unexpected challenges, ambiguities, questions, or decisions. The successful application of these skills involves reasoning, judgment, performance, and actionable results. Improper use of knowledge, experience, advancement, or other intellectual capacity Higher-order thinking skills (HOTS) are the ability to think critically and innovatively when solving problems (Venkatraman et al., 2022).

The success of educational goals depends on the implementation of policies approved by the board, including the evaluation system, which includes teachers, educational units, and board evaluations (Pratikno et al., 2022). Student evaluation is carried out by the teacher using various techniques such as tests, observations, individual or group assignments, and other forms related to competence and stages of student development (Constantinou & Wijnen-Meijer, 2022). Teachers often use assessment tools to assess students' cognitive learning outcomes, often using a textbook or a collection of questions. These questions can be either descriptive or multiple-choice. The selection of the types of questions or teacher assignments certainly plays an important role in maintaining students' thinking skills (Hwang et al., 2022). Questions or assignments that encourage analytical, judgmental, and creative thinking can effectively develop students' higher-order thinking skills.

The test is a method or procedure for measuring and evaluating education. The teacher uses a task format, a series of questions or instructions that must be completed by students to produce a score that represents their behavior or performance (Hwang et al., 2022). This value can be compared with the results of other tests or certain standards. A test is a tool used to measure or determine something within the given framework and rules (Constantinou & Wijnen-Meijer, 2022; Hwang et al., 2022). Testing is a method of systematic data collection, the purpose of which is to make internal or individual comparisons. The test tool measures the value of the variable under study. When assessing learning outcomes, tests should measure students' abilities at various levels of thinking, from low-level thinking to higher-order thinking (Amali et al., 2022; Goss, 2022). However, the test items tended to focus on lower-order thinking skills, with students prioritizing memorization and book-based problem-solving exercises over developing their higher-order thinking skills.

The development of test instruments helps students improve higher-order reasoning skills (Hwang et al., 2022). The test consists of a series of questions or exercises and additional instruments used to assess the knowledge, skills, abilities, or talents of a person or group. The following steps are necessary for preparing for the test: determining the purpose of the assessment, making a grid, designing instruments, examining and evaluating questions, and compiling revised and compiled questions (new instruments) (Brown, 2019). In

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addition, the development of test instruments includes defining variables, grouping variables into more precise indicators, compiling questions, administering tests, and evaluating validity and reliability (Xodabande & Hashemi, 2023; Yu et al., 2022). Effective language assessment must follow certain principles (Aldosari et al., 2023). These principles include practicality, reliability, validity, authenticity, and clarification, which form the basis for creating a good test. First, practicality refers to tests that are inexpensive, time-efficient, easy to administer, and have clear notes, times, and text. Second, reliability ensures that the test gives consistent and reliable results, taking into account factors such as the relationship between students and assessors, the administration, and the reliability of the test. Third, validity focuses on the applicability and suitability of the test objectives with the skills being assessed, supported by various validity evidence. In addition, authenticity prioritizes construction and test evaluation to ensure authenticity. Finally, backwash refers to the effect the test has on test takers, which affects their preparation for the assessment.

Writing is the art of creating graphic symbols or letters that correspond to the sounds writers make when they speak (Willett et al., 2021). Therefore, the development of HOTS questions aims to develop students' writing skills. In this sense, symbols must be placed in a certain order to form words, and words must be placed in a certain order to form words. Writing serves to create personal and shared meaning from experience. It is considered the most accessible and attractive method because it can visually capture thoughts and feelings and provide a satisfying picture of the inner workings of a person. In addition, the importance of process-oriented writing, which emphasizes activities that offer a variety of writing possibilities (Abdullahi et al., 2020; Conijn et al., 2021).

Research Method

This study uses a research and development (R&D) approach with the Plomp model. This method includes handling class problems, researching the latest theories about educational product design, designing educational products, validating them with experts, and conducting field evaluations (Abubakar et al., 2022; Hidayat et al., 2021; Rahmadhani & Supriadi, 2023). R&D is a cyclical research design consisting of several steps such as examining significant findings, developing products based on these findings, conducting field trials in the intended environment, and making necessary corrections based on identified problems. Following the R&D cycle, educational R&D is the process of developing and validating educational products to ensure their effectiveness. The research and development process is described schematically as follows:

The Plomp model was selected by the researchers due to its perceived greater flexibility, as each step included development activities that may be modified to fit the specifics of this study. In addition, the Plomp model's operations are organized in a straightforward, methodical, and understandable order that makes it simple to use in creating HOTS.

This research was conducted with participants selected through purposive sampling from among the students and staff members as well as lecturers and experts of MA Madani Alauddin Pao-Pao. This study involved twenty students as development targets, as well as two supervisors and two subject matter experts who assessed the feasibility of the research material. In addition, four instruments were used to collect data. First, as part of the research process, qualitative documents, particularly teacher education literature, were collected for the development of students' higher-order thinking skills. Using the Document Analysis Guide as an aid in data analysis, one should understand the various forms and aspects of thinking that educators use to diversify the assessment of students' advanced thinking skills. Second, semi-structured interviews were conducted, where the researcher prepared and asked questions based on the research topic. The purpose of the interview was to find out how the English teacher integrated the HOTS assessment into student exams. The interview process was facilitated with the help of an interview guide. Testing as part of the research and development process. Teacher assessments were collected to develop HOTS questions. Data collection was assisted by the researcher's analysis of the format of the previous exam and the teacher's understanding of the format of the questions and the media used. The validation protocol for research product evaluators is the fourth component. Inventory is used to evaluate the level of validity of each item.

Data collection and analysis procedures were determined by category. Interviews and documents were used to collect qualitative data, while quantitative data were obtained from test results and validation checklists. According to Mills & Gay, the analytical methodology for this data involves three phases of qualitative analysis (Campbell & Filimon, 2018). First, the researcher reads and records the collected data, processes it, and gathers relevant information. The information is then described in detail to ensure a complete understanding of the content. The data is then categorized by breaking it into smaller pieces and grouping them by topic. This classification process allows for a deeper understanding of each piece of data. Quantitative analysis includes expert validity, item validity, reliability, difficulty, and discriminant analysis.



Figure 1: The Plomp Model.

Results and Discussion

• Document Analysis

Document analysis is a research method that uses supporting documents such as curriculum, lesson plans, and material analysis. In this research, the documents provided information about the assessment tools used in class 10. The document, Madani Alauddin Pao-Pao's "Both You and I" material, was organized according to the 2013 curriculum and the HOTS concept. Curriculum planning is referred to as curriculum development because the government had provided a curriculum model based on the contextualization of the core competencies of the 2013 equality education curriculum (Mukminin et al., 2019; Oktavia et al., 2018; Setiawan, 2020). Trainers created individual lesson plans for each training session based on specific learning scenarios and learning contexts that varied from training session to training session.

Lesson plans must include the preparation of essential material components (Damayanti, 2020; Meiristiani, 2019). The teacher must include the main material in writing lesson plans, and all lesson plans must follow the syllabus in terms of time allocation. In addition, material analysis revealed that the lecturer used the book "Pathway to English" by Theresa Sudarwat and Eudia Grace, which was in line with the 2013 curriculum and included the HOTS concept. The fourth chapter of this book focused on correlative conjunctions and aimed to improve students' ability to use them correctly and write sentences that contained them. Overall, this research is supported by the discussion of these texts that was done above.

• Interview Analysis

Interview analysis was conducted as part of the research and data collection process. Interviews are used to gather first-hand information and to support research. In this study, interviews were conducted in accordance with the guidelines that became the reference for developing interview questions. Interview data were then transcribed into interview transcripts for presentation and analysis. The results of interviews regarding introductory texts, pictures, and scenarios, as well as the objectives of conducting the survey, are as follows:

Introductory Texts

"At first, I didn't understand how to make an introductory English text. My vocabulary in English is very minimal, and I have no talent for it. In English subjects, we were given the task of creating an introductory text using English. These results were used as a reference and consideration in preparing the HOTS instrument so that I was challenged and motivated to think harder." (Interview transcript revealed by Student A)

Pictures

"The images used are interesting and challenging so that students can develop their special abilities." (Interview with one of the teachers)

Scenarios

"The instrument development flow is very suitable to the development model used, which will produce a valid and reliable product." (Interview with one of the teachers)

Objectives the Survey

"Of course, the purpose of a survey is to expect input and criticism of a product; therefore, I think that this step is very supportive of the HOTS instrument development model, which is used to improve products before implementation." (Interview with one of the practitioners)

Based on the results of the interview above, providing special challenges can encourage students to explore their thoughts. This has a positive impact and benefits for students in developing high-level thinking skills in writing English. The results of the interview regarding the introductory text, images, and scenarios, as well as the purpose of the survey, support this research.

Test Analysis

The results of the test analysis are presented in Table 1, it can be concluded that although the curriculum, syllabus, and lesson plans require questions that are in accordance with the HOTS concept, the teacher's questions are not in accordance with the HOTS concept.

Aspect	Average Score	Categorization
Learning objectives	3.33	Very good
HOTS Test Structure	3.31	Good
HOTS activity in tests	3.30	Good
Material	3.29	Good
Average	3.30	Good

Table 1: Test Instrument Results.

In addition, the need to include learning objectives, teaching materials, teaching methods, learning resources, and evaluation results in planning the learning process (Castro & Tumibay, 2021; Navarro et al., 2016; O'Flaherty & Phillips, 2015). In addition, the test given lacks the characteristics of the effective questions proposed, namely practicality, reliability, validity, originality, and obscurity.

Validity

Evaluation is said to be valid if the evaluation accurately, correctly, and authentically expresses or measures what should be measured. To obtain valid evaluation results, an instrument is needed that meets the validity requirements of an evaluation instrument. Whether or not the evaluation is valid is determined by the factors of the evaluation instrument itself, the evaluation and scoring administration, and student responses.

Reliability

Reliability of evaluation is related to the issue of trust, namely the level of confidence that an evaluation can provide appropriate results. The meaning of this statement is that if an evaluation is carried out on the same subject, the evaluation always shows the same evaluation results or is steady and stable.

Objectivity

The objectivity of a test refers to the same level of ability score (which is possessed by students) and obtaining the same results in taking the test.

Practicality

The practicality of an evaluation means the ease of the evaluation instrument in preparing, using, interpreting, obtaining results, and storing.

• Develop HOTS Test Instruments

This study used the Plomp model to develop a HOTS writing assessment tool. This model consisted of five stages: preliminary research, design, implementation or construction, testing, evaluation, review, and implementation (Abubakar et al., 2022; Rahmadhani & Supriadi, 2023). The following are the results of each stage of HOTS test instrument formulation development.

In the preliminary research stage, researchers analyzed various factors that supported the development of test equipment. This included curriculum analysis, which was based on the 2013 curriculum and focused on the HOTS concept. Analysis of the curriculum and lesson plans showed consistency with the 2013 curriculum and the HOTS concept. The design stage consisted of three steps: collect, organize, and create. Some information was collected during the collection stage, including a curriculum adapted to the 2013 curriculum and in line with the HOTS concept. The materials collected were in the form of textbooks based on the 2013 curriculum and the concept of HOTS (Chapter 4: "Both You and I" from the student book "Pathway to English"). In addition, lesson plans were analyzed for their suitability with the 2013 curriculum and the HOTS concept. While collecting data, attention was also paid to teacher exams. The information collected was organized in an organizational fashion for the development of HOTS test kits. A syllabus is an important resource for learning development, lesson planning, and assessment system development. Subject matter plays an important role in matching exam questions to the subject matter. The RPP, which describes the flow and organization of learning, encourages the creation of assessment tools. Finally, in the creation step, the researcher used the collected and organized data to create the product, including the cover, test grid, validation sheet, and grading rubric.

The purpose of the implementation or construction stage was to produce product prototype I, in this case, to produce HOTS products. The instruments tested in this prototype acted as the first step in evaluating the materials. In the material "Both You and I" for class X Senior High School students, learning indicators must first be adjusted to Basic Competence (KD). At this stage, the researcher provided test equipment and submitted it to experts for examination. Five essays were required for the exam.

Three main activities were carried out in the testing, evaluation, and review stages. The first activity was the trial phase, which involved several steps, such as selecting experts. The researchers identified qualities of experienced ELT (English Language Teaching) teachers who could act as validators. In this phase, all test items were revised based on the validator's suggestions and recommendations. After verification, an expert validation test was carried out, where the validator evaluated the instrument that was validated, namely Prototype I, against the validation checklist. The validation sheet covered aspects such as the material being tested, its construction, language, and cover. Following were the recommendations and results of the expert test validation:

Table 2: Expert Input.

Expert 1	1.	Question instructions should be more HOTS.	
	2.	Avoid ambiguous directions.	
	3.	Let students expand their ideas.	
Expert 2	1.	Need clear direction.	
	2.	Use interesting ideas to engage students.	

Table 3: HOTS Test Instrument Validation Results.

Aspect	Average Score	Categorization
The material presented	5.65	Very Valid
Construction	3.5	Very Valid
Language	3	Valid
Cover	3	Valid
Average	3.7	Very Valid

The Validator's assessment of the HOTS test instrument based on existing data showed that the instrument was very valid but needed to be revised. Thus, these components can be integrated into Prototype II and evaluated on a small scale. After the validation stage, class X MA Madani Alauddin Pao-Pao students took part in the evaluation activity. The purpose of this activity was to assess students' higher-order thinking skills when given HOTS questions on "Both You and I." During the implementation process, researchers were expected to be ready to evaluate and further develop HOTS test instruments based on criticism and suggestions. The assessment and verification phases were critical to fixing the vulnerabilities found in testing (Shah & Mehtre, 2015). This ensured the reliability and effectiveness of the test. After receiving the evaluations from the experts, the researcher made the necessary changes in response to their comments.

During the implementation phase, the test kits were offered as HOTS-based exams in schools. Grade 10 students of MA Madani Alauddin Pao-Pao in Paccinongan, Somba Opu, Gowa, and South Sulawesi became the focus of this implementation. The Impact developed a written test instrument based on English material using the HOTS concept that can be used for the construction of Curriculum 13 (K–13). Apart from that, the results of this implementation can be a reference for educators and practitioners, especially in the field of English, in developing high-level thinking skills.

Conclusion

Based on the findings of the research and development process, it can be concluded that MA Madani Alauddin Pao-Pao implemented the construction of a Curriculum 13-based HOTS test for class X students. However, in this case, the implementation of the K13-based test did not meet all the criteria for making written HOTS instruments. The HOTS questions on "Both You and I" were developed using the Plomp development model, which included the stages of initial investigation, planning, implementation or construction, testing, evaluation, updating, and implementation. Besides that, the validator's assessment of the HOTS met the criteria. The instrument was very valid but needed to be revised. This shows the reliability and effectiveness of the HOTS test.

As a suggestion, teachers, educators, practitioners, and lecturers can use the HOTS test appropriately according to students' development to develop high-level thinking abilities. One of them can use the HOTS instrument for the material "Both You and I" in English writing. Furthermore, teachers and other researchers can also develop HOTS instruments on other materials, where the development of HOTS instruments in this research is only limited to materials (Chapter 4: "Both You and I" from the student book "Pathway to English").

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