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Feasibility Analysis of Essay Test Instruments to Assess Students' Critical Thinking Skills in Contextual Learning

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ABSTRACT

This study aims to analyze the feasibility of an essay-based assessment instrument developed to measure university students' critical thinking skills in a contextual learning setting with local cultural integration. The instrument was constructed based on critical thinking indicators proposed by and embedded within environmental science content and the Kenduri Sko cultural tradition. Five expert validators assessed the instrument using a validation sheet covering five aspects: content relevance, item construction, language clarity, practicality, and cultural sensitivity. The results show that the ten essay items validated across five aspects content relevance, construction, language clarity, practicality, and cultural sensitivity received average scores above 3.80, with an overall feasibility percentage of 96.15%, categorized as highly feasible. Validation involved five expert validators holding doctoral degrees from disciplines including science education, educational evaluation, curriculum and instruction, linguistics, and local culture. Quantitative data from the validation sheets were analyzed descriptively using mean scores and feasibility percentages, while qualitative comments highlighted the need for clearer task instructions and refinement of the 0–3 analytical scoring rubric. Overall, the findings indicate that the instrument is feasible, theoretically sound, and suitable for use as an authentic assessment tool in culturally contextualized learning in higher education. Further empirical testing and reliability analysis are recommended for broader implementation.
Key word: Critical thinking skills; Contextual learning; Instrument validation; Open-ended essay; Local culture

I. INTRODUCTION

Higher education in the 21st century faces the challenge of preparing graduates who not only master theoretical knowledge but are also capable of critical thinking, solving complex problems, and adapting to ever-changing social, cultural, and ecological contexts (Boies et al., 2015; Foronda et al., 2016). Among various 21st-century skills, critical thinking holds a central position as the foundation of higher-order thinking necessary for evidence-based decision-making, open-ended problem solving, and reflective engagement with real-world situations (Greenstein, 2012; Trilling et al., 2009).

Critical thinking involves the ability to analyze arguments, evaluate evidence, recognize assumptions, draw logical conclusions, and reflect on one's own thought processes (Alsaleh, 2020; Facione, 2000). In the context of science education, particularly environmental science, these skills are essential for students to go beyond declarative understanding of scientific concepts and to apply them critically and contextually to real-life issues such as pollution, water crises, climate change, and socio-ecological inequalities (Suyitno et al., 2024). However, critical thinking skills cannot be effectively developed or measured without valid, reliable, and context-sensitive assessment instruments (Ali et al., 2005; Amin, 2020; Sutarno et al., 2019). Instruments that fail to consider cognitive processes and the contextual realities of learning may lead to unrepresentative or even misleading evaluations. For instance, assessments relying solely on multiple-choice items often fall short in capturing how students construct reasoning, consider perspectives, and formulate logical arguments (Sutarno et al., 2019). Therefore, open-ended task-based assessments such as essay tests are needed to allow students to explicitly demonstrate their thinking processes.

On the other hand, in the culturally diverse context of Indonesia, contextual learning approaches that integrate local values have increasingly gained attention. Problem-Based Learning (PBL) infused with local cultural content not only enhances the relevance of learning but also strengthens students' ecological and cultural literacy (Chua & Liu, 2024; Gannot et al., 2023; Salazar et al., 2023; Siregar et al., 2018). This raises a critical question: Do we currently have feasible and ready-to-use critical thinking assessment instruments suitable for such a context? Although several previous studies have attempted to develop instruments for measuring critical thinking skills, most of them rely heavily on quantitative formats such as Likert scales or multiple-choice questions. These formats tend to measure recognition rather than reasoning, and therefore fail to capture the depth of students' analytical processes. Notably, there is a clear absence of essay-based instruments that allow students to articulate arguments, evaluate evidence, and demonstrate their thinking processes in an open-ended manner. Moreover, many existing instruments were only tested through limited pilot studies without rigorous, systematic content validation by qualified experts. This gap indicates an urgent need for developing a culturally contextualized essay test instrument that more accurately represents the complexity of critical thinking skills (Amin, 2020). Very few studies have examined the feasibility of essay-based instruments grounded in a strong theoretical framework of critical thinking such as that of (Ennis, 2011) and validated them through expert reviews across multiple perspectives, including education, assessment, language, and culture.

This study aims to address that gap. It focuses on analyzing the feasibility of essay test instruments developed to assess university students' critical thinking skills in science learning based on problem-solving and local culture. Validation was

conducted by experts who evaluated the instruments in terms of content, construct, language, applicability, and cultural fairness (Ali et al., 2005; Amin, 2020; Sutarno et al., 2019). The novelty of this research lies in two key aspects. First, the validation approach goes beyond content evaluation by including considerations of implementability and cultural responsiveness two often overlooked aspects in instrument development.

Second, the validated instrument is essay-based, developed using Ennis's critical thinking indicators, and contextualized within environmental science learning that integrates local cultur specifically the Kenduri Sko tradition. The selection of Kenduri Sko as the contextual foundation is supported by its strong cultural, ecological, and social relevance within the Kerinci community. Kenduri Sko is not only a ceremonial tradition, but also a medium for transmitting local wisdom, environmental stewardship values, and customary norms that shape community interactions with nature (Helida, 2016). Furthermore, the ceremony reflects a collective socio-cultural system involving various community roles, including the significant participation of women, which illustrates local perspectives on decision making, responsibility, and communal problem solving (Hardi et al., 2021). In addition, Kenduri Sko embodies traditional governance values such as negotiation and environmental ethics embedded in the *Ngajon Arah* process, making it a rich and authentic context for stimulating students' critical thinking in analyzing real socio-ecological issues (Khalid, 2022). Therefore,

integrating Kenduri Sko into assessment tasks provides a culturally responsive approach that bridges scientific literacy with local values, enhances contextual relevance, and allows students to engage cognitively and reflectively with environmental topics rooted in their cultural environment.

The validation results not only ensure that the instrument meets scientific feasibility standards but also offer a valuable reference for educators, researchers, and curriculum developers aiming to implement authentic, meaningful, and context-based critical thinking assessment. Thus, this article is expected to contribute to the enrichment of the literature on critical thinking assessment in higher education, particularly in culturally embedded science education.

II. RESEARCH METHOD

This study employed a quantitative descriptive approach with an expert judgment validation design. The primary focus was to assess the feasibility of a critical thinking essay test instrument developed based on the critical thinking components proposed by (Ennis, 2011), within the context of problem-based environmental science learning infused with local cultural elements. The instrument was evaluated by a panel of experts from various relevant fields to ensure comprehensive content validity.

This research falls under the category of non-experimental studies aimed at describing the feasibility level of the instrument based on expert evaluations. The instrument validation design followed

the stages proposed by (Cohen et al., 2007), namely: (1) developing a test blueprint and items, (2) reviewing the items based on relevant theories and indicators, (3) validating through expert assessment, and (4) analyzing the validation results to determine the instrument's feasibility.

The subjects in this study consisted of five expert validators selected purposively based on their competence in instrument development and education. The validators held at least a doctoral degree (Ph.D.) and came from relevant disciplines, including science education, educational evaluation, curriculum and instruction, linguistics, and local culture. The selection criteria for validators included: (1) experience in developing and evaluating educational instruments, (2) a proven track record of scholarly publications in relevant fields, and (3) willingness to provide objective assessments of the instrument. The diversity of their areas of expertise was intended to provide a holistic perspective on the quality of the instrument, including its content, construct, language, applicability, and cultural sensitivity.

The data sources in this study were the completed validation sheets submitted by the expert validators. The validation sheet consisted of 22 statements grouped into five aspects: content, construct, language, applicability, and cultural fairness. Each item was rated using a four-point Likert scale (1 = Not Feasible, 2 = Less Feasible, 3 = Feasible with Revisions, 4 = Highly Feasible), and included space for comments and suggestions for improvement from each validator.

Quantitative data in the form of rating scores were analyzed to obtain mean scores and instrument feasibility percentages, while qualitative data in the form of comments were thematically analyzed to identify more detailed suggestions for instrument refinement.

The primary instrument in this study was a critical thinking essay test developed based on (Ennis, 2011) theoretical framework, which includes five key aspects of critical thinking: (1) clarification, (2) inference, (3) induction, (4) decision making/problem solving, and (5) self-regulation/metacognition. The instrument consisted of 10 essay questions, each designed to assess a specific critical thinking indicator. All items were contextualized within a problem-based environmental science learning framework and integrated with local cultural values, specifically the Kenduri Sko tradition, to align with a contextual learning approach. Each item was accompanied by measurement indicators and an analytic scoring rubric that covered dimensions such as clarity of argument, logical strength, reflective ability, and accuracy in using data. The rubric was descriptively structured using a 0–3 point scale for each indicator, enabling assessors to evaluate students' thinking processes in a more comprehensive manner. A score of 0 indicates that the student's response does not demonstrate the expected critical thinking indicator at all or contains irrelevant or incorrect reasoning. A score of 1 reflects minimal evidence of the indicator, where the student provides a partial or unclear explanation with weak logical

support. A score of 2 represents adequate performance, in which the student demonstrates the indicator with generally appropriate reasoning, although some aspects may lack clarity or depth. Finally, a score of 3 signifies a high level of mastery, where the student presents a clear, well-structured argument supported by relevant evidence and demonstrates strong analytical and reflective thinking consistent with the targeted indicator.

The validation data were analyzed using descriptive quantitative methods. Each score from the validators was compiled into a summary table, then the following calculations were performed:

a. Average Score per Item
b. Feasibility Percentage = (Average Score / Maximum Score) × 100%
c. Feasibility Category, based on the criteria presented in Table 1 below

Table 1. Instrument Feasibility Category Based on Validation Percentage

Percentage (%)	Feasibility Category
≥ 85%	Highly Feasible
70% – < 85%	Feasible with Revisions
55% – < 70%	Less Feasible
< 55%	Not Feasible

Source: (Akbar, 2013)

III. RESULT AND DISCUSSION

The results of expert validation on the essay-based instrument for assessing students' critical thinking skills in contextual learning are presented in both quantitative and qualitative forms. A total of five expert validators assessed the instrument using a validation sheet consisting of 22 items across five aspects: content relevance, construction, language, practicality, and cultural sensitivity.

The average score from all validators for each item ranged from 3.6 to 4.0 on a scale of 1–4. The analysis showed that all items received validation percentages above 85%, placing the instrument within the "Highly Feasible" category. The detailed analysis per aspect is summarized in the following Table 2.

Table 2. Summary of Validation Results by Assessment Aspect

Assessment Aspect	Average Score	Feasibility (%)	Category
Content Relevance	3,84	96.00%	Highly Feasible
Construction	3,92	98.00%	Highly Feasible
Language	3,9	97.50%	Highly Feasible
Practicality	3,8	95.00%	Highly Feasible
Cultural Sensitivity	3,85	96.25%	Highly Feasible
Overall Validation	3,86	96.15%	Highly Feasible

(Source: Analyzed from Primary Data)

Based on the validation results presented in Table 2, the practicality aspect obtained the lowest average score (3.8 or 95%), whereas the construction aspect achieved the highest score (3.92 or 98%). This difference reflects the evaluators' considerations regarding the instrument's usability and structural clarity.

The practicality aspect received the lowest rating because several validators noted that the implementation of the essay-based instrument may require additional time for administration and scoring, especially when applied to large classes. Validators also highlighted the need for further refinement of the scoring rubric to ensure consistent assessment across different raters. These factors contributed to the perception that, although the instrument is feasible, its practical

application in diverse instructional settings still requires minor adjustments.

In contrast, the construction aspect obtained the highest score because the validators found that the items were well structured, systematically aligned with the critical thinking indicators, and presented in a logical sequence from context to question prompt. The clarity of item formulation and the strong connection between the stimulus and the targeted indicators were considered strengths of the instrument. This indicates that the structural design of the test items already meets high standards of assessment instrument development.

Overall, the difference in these scores suggests that while the conceptual and structural foundations of the instrument are highly robust, minor improvements in practical implementation—particularly related to time efficiency and rubric clarity—would further enhance its usability.

These findings confirm that the instrument meets the criteria of validity in all aspects assessed. No item was categorized as "Less Feasible" or "Not Feasible," indicating consistency and reliability in the instrument's quality based on expert judgments.

In addition to the quantitative assessments, validators also provided qualitative feedback that offered valuable insights for refining the instrument. These comments were collected through the open-ended section of the validation sheet and analyzed thematically. Overall, validators agreed that the essay-based instrument was relevant to the indicators of critical thinking skills based on Ennis's framework and was well aligned with the contextual approach to learning environmental science enriched with local cultural values.

Some validators suggested improvements related to the clarity of task instructions. They emphasized that certain prompts should be made more explicit and directive to prevent ambiguity among students. For example, validators recommended adding clearer guidance such as specifying the expected length of the response (e.g., "Explain your answer in 3–5 sentences"), clarifying the cognitive process required (e.g., "Identify the main assumption and provide evidence to support your reasoning"), or explicitly instructing students to refer to the contextual information provided in the Kenduri Sko scenario. These concrete additions are expected to help students better understand the task demands and ensure that their responses align with the targeted critical thinking indicators. Clear and focused instructions are essential to ensure that students understand the expectations of the task, enabling them to demonstrate their critical thinking processes effectively. Moreover, alignment between the stimulus, the questions, and the targeted indicators was considered important for ensuring measurement validity.

Regarding context, the integration of the *Kenduri Sko* local tradition into the questions was positively received. Validators acknowledged this as a strength of the instrument, highlighting that the cultural elements not only enhanced relevance but also encouraged students to

think critically within authentic, real-life scenarios. This demonstrated the instrument's cultural responsiveness and absence of bias.

In terms of scoring, several validators recommended expanding or clarifying the analytic rubric—especially for borderline cases that may require more nuanced interpretation. They suggested the inclusion of sample responses or more detailed scoring descriptors to help ensure consistency and fairness in scoring across different raters. Overall, the qualitative feedback supported the quantitative findings and reinforced the conclusion that the instrument is not only theoretically and content-wise valid, but also feasible and appropriate for practical application in culturally contextualized higher education learning environments.

The results of the study indicate that the essay test instrument developed to assess students' critical thinking skills in contextual learning achieved a very high level of validation (Amin, 2020; Jamil et al., 2024; Lestari et al., 2024). The average scores from the five validators ranged from 3.80 to 3.92, with feasibility percentages for each aspect exceeding 95%. According to the instrument feasibility interpretation criteria, all aspects were categorized as "Highly Feasible." The validation was carried out comprehensively across five key aspects: content, construct, language, applicability, and cultural sensitivity. The following is a detailed discussion of each aspect.

A. Content Validation

The content aspect serves as the primary foundation in instrument validation, as it directly relates to the representativeness of indicators and the accuracy of measuring the intended competencies (Adri & Abdullah, 2022; Amin, 2020; Pacheco & Herrera, 2023; Rahimi, 2025; Sung et al., 2012). The instrument developed in this study was based on (Ennis, 2011) critical thinking framework, which includes clarification, inference, induction, decision making, and self-regulation (Gonzalez-Argote & Castillo-González, 2024; Liou et al., 2016; Waluya & Suyitno, 2020; Zuriguel-Pérez et al., 2022). Each item was developed based on specific indicators within these aspects and was contextualized in real-life environmental science content relevant to students' experiences. The average score for the content aspect was 3.84 (96%), indicating that the validators deemed the items to be well-aligned with the critical thinking indicators being measured. Moreover, embedding the questions within the cultural context of Kenduri Sko further strengthened content validity by anchoring the assessment in students' lived experiences (S. Suciati et al., 2024; Thornhill-Miller et al., 2023; Tullah & Desriyeni, 2023). This aligns with (Akbar, 2013) assertion that content validity can be enhanced through contextual and authentic material approaches.

B. Construct Validation

The construct aspect relates to sentence clarity, item structure, and the alignment between stimuli and instructions (Ee et al., 2023; Jaedun et al., 2022; Marpelina et al., 2025; Montaku et al., 2012). The average score of 3.92 (98%) was the highest among all validated aspects.

Validators found that the items were logically structured, presented in a systematic order from context to question to scoring rubric. The use of a PBL format was also deemed appropriate, as it encourages students to explore their thinking processes rather than rely on rote memorization (Irons & Thomas, 2016; Pozuelo-Muñoz et al., 2023; Puja Astawa & Suweken, 2019; Urcola-Pardo et al., 2024). This model prompts learners to analyze, evaluate, and construct arguments core components of higher-order critical thinking (Jumrodah et al., 2021; Moehead et al., 2020). Some suggestions from validators included improving the alignment between the stimulus and the question prompt to make them more explicit. This is important to ensure students understand the problem context and direct their responses in accordance with the targeted thinking skills.

C. Language Validation

Language is a critical component in essay-based instruments, as it directly affects students' understanding of instructions (Lawanto & Santoso, 2014; Puspa et al., 2024; Seyaningsih & Sari, 2021; Susdarwati et al., 2021). This aspect includes sentence clarity, proper use of terminology, and avoidance of ambiguity (de Oliveira et al., 2021; Troelsen & Japikse, 2022). An average score of 3.90 (97.5%) showed that the instrument used standard, clear, and communicative language. Validators noted that scientific terms were used appropriately and in context, with minimal potential for misinterpretation. However, some minor suggestions were given, such as simplifying diction in specific instructions and avoiding terms that might be unfamiliar to students. This aspect is vital because poorly worded items can obscure the assessment's purpose and compromise data validity. As emphasized, clear and unambiguous language is one of the fundamental requirements for high-quality instrument development (Herpiana et al., 2019; Rathouská et al., 2021; Wafi et al., 2023).

D. Applicability Validation

The applicability aspect evaluates the practicality of the instrument in various instructional settings, including time efficiency, flexibility of use, and ease of scoring (Bakri et al., 2019; Gonzalez-Argote & Castillo-González, 2024; Winarti & Iriani, 2021). An average score of 3.80 (95%) suggested that the instrument was considered practical for classroom use. Validators indicated that the test items could be administered individually or in groups and were appropriate for PBL scenarios (Kwak & Oh, 2018; R. Suciati et al., 2022; Thornhill-Miller et al., 2023). The completion time was deemed proportional to the number and complexity of the items. The scoring rubric was also considered adequate for objectively evaluating students' thinking processes. Nonetheless, some suggestions included expanding the rubric to accommodate a range of borderline responses, thereby enhancing inter-rater reliability (Houser et al., 2020; Mlika et al., 2023). This is essential for ensuring consistent interpretations across different teachers or instructors.

D. Cultural Sensitivity Validation

This instrument is unique in that it integrates local cultural elements into each

item specifically the Kenduri Sko tradition as a problem context. This aspect was validated to ensure that the use of culture did not introduce bias or discrimination and enhanced contextual relevance (Herpiana et al., 2019; Seyaningsih & Sari, 2021). An average score of 3.85 (96.25%) indicated that validators found the instrument to be culturally fair and free of stereotypes. They also appreciated the use of local cultural integration as a meaningful approach to contextualize learning and promote science literacy in the local community (Amin, 2020; Jumrodah et al., 2021). This is aligned with the principles of *culturally responsive assessment*, which are widely advocated in localized educational evaluation.

Overall, the final average validation score was 3.86, with a feasibility percentage of 96.15%, which falls under the "Highly Feasible" category. This indicates that the developed essay test instrument meets all scientific feasibility criteria in terms of content, construct, language, applicability, and cultural fairness, and is ready for further field testing or implementation in instructional settings (Amin, 2020; Moehead et al., 2020; Puja Astawa & Suweken, 2019).

IV.CONCLUSION

Based on validation results from five expert reviewers, the essay-based instrument for assessing critical thinking in contextual learning was classified as highly feasible. All assessed aspects content, construction, language, practicality, and cultural sensitivity achieved an average score of 3.86 with a feasibility percentage of 96.15%. The instrument effectively reflects

critical thinking indicators grounded in (Ennis, 2011) framework and successfully integrates local cultural context through the *Kenduri Sko* tradition. Its problem-based, open-ended format was also considered capable of stimulating students' higher-order thinking. Therefore, the instrument can be used as an authentic assessment tool in higher education and is recommended for further field testing to ensure its reliability. In addition, the validated instrument provides meaningful implications for educators, particularly those implementing culturally based learning approaches. By integrating local cultural contexts such as the Kenduri Sko tradition, this instrument enables educators to assess students' critical thinking skills in a manner that is more relevant, contextual, and aligned with learners' sociocultural backgrounds. Thus, it serves not only as a measurement tool but also as a pedagogical resource that supports culturally responsive teaching practices in science education.

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