

TOWARD A HOLISTIC MODEL OF HIGHER-ORDER THINKING ASSESSMENT IN ISLAMIC ENVIRONMENTAL EDUCATION: INTEGRATING AUTHENTIC ASSESSMENT, MORAL REASONING, AND SUSTAINABILITY

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ABSTRACT

The integration of Higher-Order Thinking Skills (HOTS) into Islamic education has become increasingly important in preparing learners to address complex environmental challenges through critical inquiry and ethical responsibility. Nevertheless, empirical evidence explaining how classroom assessment simultaneously cultivates higher-order thinking, moral reasoning, and sustainable behaviour remains limited. Consequently, this qualitative case study investigates how Islamic Education teachers implement HOTS assessment through the integration of environmental education in Malaysian secondary schools. Data were collected from three purposively selected teachers using semi-structured interviews, classroom observations, and document analysis, including lesson plans, students' work, and school-based assessment records. Furthermore, the data were analysed thematically following the procedures of Miles, Huberman, and Saldaña. The findings reveal that HOTS assessment extends beyond merely measuring cognitive achievement by functioning as a holistic pedagogical process. It integrates authentic assessment, Islamic environmental ethics, and continuous classroom evaluation. Teachers employed oral questioning, contextualised written tasks, and behavioural observation to promote students' abilities to analyse environmental problems, evaluate alternative solutions, reflect on Islamic values, and demonstrate responsible environmental practices. Based on these findings, the study proposes a conceptual model linking authentic HOTS assessment with higher-order thinking, moral reasoning, environmental stewardship, and responsible behavior. This model not only advances scholarship in Islamic education but also provides a theoretically grounded framework that connects holistic Islamic pedagogy with Education for Sustainable Development. Moreover, it offers practical guidance for designing value-based assessment in contemporary classrooms, thereby potentially enriching instructional strategies and fostering meaningful student engagement with environmental concerns.

Keywords: Authentic Assessment, Education for Sustainable Development, Higher-Order Thinking Skills, Islamic Environmental Education, Islamic Environmental Ethics, Moral Reasoning

INTRODUCTION

The development of Higher Order Thinking Skills (HOTS) has become a central priority in educational reform worldwide because education systems increasingly seek to prepare learners for complex social, technological, and environmental challenges. Moreover, international educational agendas emphasize that students should not only acquire disciplinary knowledge but also develop the capacity to critically analyze information, evaluate competing perspectives, solve authentic problems, and make responsible decisions in contexts characterized by uncertainty and rapid change (Anderson & Krathwohl, 2001; Felix et al., 2025;

Loyens et al., 2023; UNESCO, 2017). As a result, classroom assessment is progressively expected to broaden beyond simply measuring factual recall; instead, it should focus on evaluating learners' higher-order cognitive processes, ethical reasoning, and real-world problem-solving abilities. Furthermore, within this global movement, assessment is no longer viewed solely as a mechanism for measuring learning outcomes; rather, it has become an integral pedagogical process that actively shapes students' intellectual development and responsible citizenship.

These global developments have significantly influenced educational reforms in many countries, including Malaysia, where the cultivation of HOTS has become a major objective of curriculum reform. As part of this ongoing transformation, through the Malaysia Education Blueprint 2013-2025, higher-order thinking is identified as one of the core student aspirations necessary to enhance educational quality and competitiveness in international assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) (Ministry of Education Malaysia, 2013). Although elements of critical and creative thinking have historically existed within Malaysian curricula since the introduction of Creative and Critical Thinking Skills (CCTS) in the 1980s, subsequent reforms have progressively emphasized the integration of HOTS into curriculum design, teaching practices, and classroom assessment (Nagappan, R, 2001, 2010a, 2010b). These developments, therefore, reflect a broader shift from merely transmitting knowledge toward competency-based learning, which in turn requires teachers to design assessment tasks capable of measuring students' analytical, evaluative, and creative thinking.

Within this educational transformation, Islamic education occupies a distinctive position because its educational philosophy extends beyond cognitive achievement to encompass the holistic development of intellectual, moral, spiritual, and social dimensions of learners. Specifically, Islamic educational philosophy conceptualizes learning as a process of *ta'dib*, whereby knowledge should cultivate righteous character (*akhlak*), sound judgement, and responsible action, rather than merely transmitting information (Al-Attas, 1980; Langgulung, 1988). As a result, the integration of HOTS into Islamic education should not simply encourage critical thinking; rather, it should also enable learners to evaluate complex issues through Islamic ethical principles and effectively translate their reasoning into responsible behaviour. Furthermore, this holistic orientation suggests that assessment within Islamic education should not be limited to measuring students' cognitive performance alone; instead, it should also evaluate their capacity to integrate knowledge, moral reasoning, and ethical action, thereby ensuring a more comprehensive understanding of their development.

Subsequently, environmental education provides a particularly important context in which this holistic approach to assessment can be realised. Moreover, contemporary environmental challenges, including climate change, biodiversity loss, pollution, and unsustainable resource consumption, require learners to analyse complex problems, evaluate alternative solutions, and make ethically informed decisions (Howell et al., 2026; Hsia et al., 2024; Rekan et al., 2024). From an Islamic perspective, environmental stewardship is inseparable from the concepts of *khalifah* (human stewardship), *amanah* (trust), *mizan* (balance), and *wasatiyyah* (moderation). Collectively, these concepts position environmental responsibility as both an educational and religious obligation (Foltz et al., 2003; Nasr, 1996; Rekan & Mokhtar, 2025). Therefore, integrating environmental education into Islamic education not only provides an authentic learning context but also enables HOTS assessment to simultaneously evaluate cognitive reasoning, ethical judgment, and environmentally responsible behaviour. As such, this approach aligns Islamic educational principles with the broader global objectives of Education for Sustainable Development (Musa et al., 2024; Rekan & Mokhtar, 2025; UNESCO, 2017).

Despite growing scholarly interest in HOTS within Islamic education, existing research has predominantly examined teachers' perceptions, readiness, instructional practices, and implementation challenges (Adam & Abdul Latif, 2018; Ahmad et al., 2020; Ajmain et al., 2024; Alotaibi, 2024; Masran & Esha, 2018; Sarkawi, 2023). While these studies have generated valuable insights into curriculum implementation, considerably less attention has been devoted to how HOTS are actually assessed in classroom practice, particularly within learning contexts that integrate Islamic values and environmental education. In addition, previous studies have tended to conceptualize HOTS primarily as a cognitive construct. Hence, they often overlook the broader pedagogical function of assessment in fostering moral reasoning, environmental responsibility, and ethical decision-making. This oversight is especially significant in Islamic education, where intellectual development is inseparable from character formation and social responsibility. Therefore, understanding how HOTS are assessed in real classroom settings, especially in such holistic educational frameworks, remains an area needing further exploration to bridge this gap.

To address this gap, the present study investigates how Islamic Education teachers implement HOTS assessment through the integration of environmental education in classroom practice. In particular, the study explores the assessment strategies employed to evaluate students' higher-order thinking while also promoting Islamic environmental ethics and moral reasoning. Likewise, the study is guided by an integrated theoretical framework that combines Holistic Islamic Education (Al-Attas, 1980; Langgulung, 1988), Islamic Environmental Ethics (Foltz et al., 2003; Nasr, 1996; Rekan & Mokhtar, 2025), Education for Sustainable Development (UNESCO, 2017), Authentic Assessment (Wiggins, 1998), and Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). Collectively, these diverse yet complementary perspectives conceptualize HOTS assessment as a multidimensional pedagogical process that simultaneously develops higher-order cognitive skills, ethical judgment, and environmental stewardship. In addition, by positioning assessment at the intersection of Islamic pedagogy and sustainability education, this study aims to contribute to a more comprehensive understanding of how classroom assessment can effectively support holistic learner development within contemporary Islamic education.

METHOD

This study employed a qualitative case study design to explore how Higher Order Thinking Skills (HOTS) assessment was implemented through the integration of environmental education within Islamic Education classrooms. A qualitative case study was considered appropriate because it enables an in-depth examination of naturally occurring pedagogical practices within their real educational contexts, allowing researchers to understand not only what assessment strategies teachers employ but also how these practices reflect broader educational values and instructional purposes (Yin, 2018). Furthermore, consistent with the integrated conceptual framework adopted in this study, HOTS assessment was conceptualized as a multidimensional pedagogical process that simultaneously promotes higher-order cognitive skills, moral reasoning, and environmental stewardship. This perspective draws upon Holistic Islamic Education, which emphasizes the balanced development of intellectual, moral, and spiritual capacities (Al-Attas, 1980; Langgulung, 1988). Additionally, Islamic Environmental Ethics frames environmental responsibility through the principles of *khalifah*, *amanah*, and *mizan* (Foltz et al., 2003; Nasr, 1996; Rekan & Mokhtar, 2025). To broaden the conceptual foundation, the study also incorporates Education for Sustainable Development (UNESCO, 2017), Authentic Assessment (Wiggins, 1998), and Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). These complementary perspectives, therefore, informed both the design of

the study and the interpretation of classroom assessment practices. In terms of methodology, the study involved three purposively selected Islamic Education teachers from Malaysian secondary schools, who were actively engaged in implementing sustainability-related programmes within their respective schools. The participants, owing to their substantial experience in integrating environmental sustainability into Islamic Education teaching and learning, provided rich insights. To maintain confidentiality, they were identified as Islamic Education Teacher 1 (IET1), Islamic Education Teacher 2 (IET2), and Islamic Education Teacher 3 (IET3). Finally, data collection was undertaken over the course of 2024 and 2025, ensuring a comprehensive understanding of the ongoing practices.

Data were collected through semi-structured interviews, non-participant classroom observations, and document analysis to facilitate methodological triangulation and provide a comprehensive understanding of classroom assessment practices. Specifically, semi-structured interviews explored teachers' conceptions of HOTS, assessment purposes, and the integration of environmental values into Islamic Education. Additionally, classroom observations focused on documenting how oral, written, and observational assessments were implemented during instruction, with particular attention to opportunities for students to demonstrate analytical thinking, moral reasoning, and environmentally responsible behaviour. Furthermore, documentary evidence, including lesson plans, students' worksheets, examination papers, and School-Based Assessment records, was analyzed to examine how HOTS and environmental ethics were embedded within assessment design and instructional planning. By collecting data from multiple sources, the researchers enabled themselves to compare teachers' stated beliefs with their observed classroom practices, thereby strengthening the credibility of the findings.

Finally, the data were analyzed using inductive thematic analysis following the interactive model proposed by Miles, Huberman, and Saldaña (2014). To begin with, interview transcripts, observation field notes, and documentary materials were first organized and coded through repeated reading, which helped identify meaningful units related to HOTS assessment. These initial codes were then subsequently grouped into broader themes that represented assessment strategies, pedagogical purposes, and the integration of Islamic environmental values. Throughout the analytical process, these themes were interpreted using the study's integrated conceptual framework, allowing for a comprehensive examination of how classroom assessment reflected the interconnected development of higher-order thinking, ethical judgement, and environmental stewardship. Moreover, to enhance the trustworthiness of the findings, methodological triangulation was achieved by comparing evidence across interviews, observations, and documentary sources. Additionally, thematic interpretations were continuously refined through iterative comparison of emerging patterns across participants, as recommended by Miles et al. (2014), ensuring a more robust analysis.

RESULTS AND DISCUSSION

HOTS Assessment as a Holistic Pedagogical Process in Islamic Education

Analysis of the interview, classroom observation, and document data consistently demonstrated that participating teachers implemented Higher Order Thinking Skills (HOTS) assessment as an integral component of classroom learning rather than as a separate evaluative activity. Moreover, across all three cases, teachers described assessment as a continuous process embedded within instruction to monitor students' understanding, while simultaneously encouraging active participation and reflection. Classroom observations further confirmed that assessment took place throughout the learning process through teacher questioning, guided discussions, written tasks, and observation of students' classroom participation. These practices were not only frequently observed but also consistently reflected in lesson plans and assessment documents, which incorporated HOTS-oriented learning objectives and assessment activities

throughout each lesson, thus ensuring alignment between instructional goals and assessment practices.

Triangulation of the three data sources further revealed that assessment practices extended beyond merely evaluating students' academic achievement. Specifically, interview participants explained that assessment activities were intentionally designed not only to measure knowledge but also to encourage students to relate classroom content to real-world situations. In particular, they emphasized environmental issues encountered in their local communities (IET3). These claims were substantiated by classroom observations, during which students were regularly asked to analyze authentic situations, justify their responses, and explain appropriate actions based on Islamic teachings. Furthermore, documentary analysis supported these findings, showing that lesson plans and students' learning activities effectively integrated environmental topics with assessment tasks. These tasks required students to engage in explanation, reflection, and problem-solving, rather than merely recalling facts.

In addition, the findings demonstrated that teachers consistently incorporated moral and behavioral aspects into classroom assessments. During classroom observations, students were evaluated not only on the correctness of their answers but also on their ability to demonstrate responsible attitudes during discussions and activities. Moreover, interview data indicated that teachers prioritized students' reasoning, participation, and willingness to apply Islamic values when responding to environmental issues, considering these as vital components of assessment (IET1). This pattern was clearly reflected in assessment records and classroom documents, which included criteria related to participation, responsibility, and the application of values alongside cognitive achievement, thereby emphasizing a holistic approach to evaluation.

Across all participants, the convergence of interview, observation, and documentary evidence indicates that HOTS assessment was implemented as a holistic classroom practice, effectively integrating continuous assessment, authentic learning activities, and value-oriented evaluation. Moreover, rather than relying solely on formal testing, teachers employed multiple assessment opportunities throughout instruction in order to monitor students' thinking, classroom engagement, and responses to environmental issues within Islamic Education lessons. These comprehensive findings, therefore, provide the overarching context for the subsequent themes, which describe in greater detail the specific oral, written, and observational assessment strategies used to support HOTS in classroom practice.

Developing Higher-Order Cognitive Skills through Authentic Assessment Oral Assessment

Analysis of interview, classroom observation, and lesson documentation consistently indicated that oral assessment was implemented through questioning, classroom discussion, and problem-based dialogue that required students to move beyond factual recall. Rather than asking students to reproduce information from textbooks, teachers presented environmental issues encountered in daily life and encouraged students to analyse the causes of these problems before proposing appropriate responses. During classroom observations, students were frequently asked to explain relationships between environmental degradation and human behaviour, compare alternative courses of action, and justify their opinions using examples drawn from their own experiences. Furthermore, interview data confirmed that teachers intentionally used oral questioning to stimulate students' reasoning and to assess how they constructed arguments, rather than simply identifying correct answers (IET2). This approach fostered a more thoughtful engagement with the subject matter.

Triangulation across interviews and classroom observations further showed that classroom discussions encouraged students to evaluate environmental situations from multiple perspectives before reaching conclusions. Teachers frequently extended students' initial responses through follow-up questions such as "*Why?*", "*What would happen if...?*", and "*Which solution is most appropriate?*" (IET3). These probing questions prompted students to reconsider their assumptions, compare different viewpoints, and provide evidence for their decisions. As a result, observation data demonstrated that such discussions often developed collaboratively, with students responding to and building upon one another's ideas. Additionally, lesson plans similarly incorporated discussion activities centred on authentic environmental scenarios, indicating that opportunities for analysis and evaluation had been intentionally embedded within classroom instruction to enhance critical thinking and practical understanding.

The findings also revealed that oral assessment occasionally required students to generate new ideas for addressing environmental challenges within their school and community contexts. Moreover, during observed lessons, students proposed practical initiatives, including improving waste management, promoting water conservation, and encouraging environmentally responsible behaviour among peers. Interview participants explained that these activities were intended to assess students' ability to apply their knowledge in developing realistic solutions, rather than merely identifying environmental problems (IET1). Supporting this, documentary evidence showed that classroom activities required students to formulate recommendations and present reasoned solutions as part of ongoing assessment.

Written Assessment

Document analysis and classroom observations revealed that written assessment extended beyond conventional short-answer or multiple-choice questions. Teachers regularly employed essay questions, authentic environmental case studies, and reflective writing tasks that required students to organise information, justify their reasoning, and apply Islamic teachings to environmental issues. Examination papers and students' worksheets consistently presented contextualised situations rather than isolated factual questions; consequently, these assessments required learners to interpret environmental problems before developing appropriate responses. Furthermore, interview participants explained that written assessment was deliberately designed to evaluate students' reasoning processes and their ability to connect classroom learning with contemporary environmental challenges (IET1).

Classroom observations further demonstrated that authentic environmental cases were frequently used to encourage students to analyse real-life situations before evaluating possible solutions. Students were asked to interpret issues such as pollution, waste disposal, and environmental cleanliness by considering both practical consequences and Islamic responsibilities. Instead of producing predetermined responses, students were expected to explain the rationale underlying their decisions and support their arguments with relevant examples. Documentary evidence confirmed that these contextual tasks formed a regular component of classroom assessment rather than isolated enrichment activities.

A further finding concerned the use of reflective writing as part of continuous classroom assessment. Teachers encouraged students to record their personal reflections on environmental practices and, additionally, to evaluate how Islamic values could be applied within their daily lives. Interview data indicated that reflective writing enabled teachers to assess students' depth of understanding; furthermore, it allowed them to gauge their capacity to relate environmental issues to their own experiences (IET3). This finding was corroborated by students' written work, which demonstrated varying levels of analysis, justification, and personal reflection regarding environmental responsibility. Alongside this, across all three data sources, written assessment consistently required students to engage with authentic situations, construct reasoned arguments, and communicate solutions supported by evidence, rather than relying solely on

memorized knowledge. In conclusion, these methods collectively contributed to a comprehensive understanding of students' learning processes, emphasizing the importance of reflective and applied skills in environmental education.

Integrating Islamic Environmental Ethics into Classroom Assessment

Analysis of the interview, classroom observation, and documentary data consistently revealed that environmental assessment in Islamic Education extended beyond evaluating students' knowledge of environmental issues. Furthermore, across all participating teachers, assessment activities incorporated Islamic values by requiring students to explain, justify, and demonstrate environmentally responsible actions within authentic learning contexts. Interview participants explained that environmental topics were assessed not only through students' understanding of ecological concepts but also through their ability to relate these issues to Islamic teachings and everyday practices. In addition, classroom observations supported these statements, showing that teachers frequently encouraged students to connect environmental problems with religious responsibilities during questioning, discussions, and classroom activities. Moreover, lesson plans and assessment documents likewise integrated learning objectives that combined environmental understanding with the application of Islamic values.

A recurring finding across all three data sources concerned the assessment of environmental responsibility. During classroom observations, teachers consistently evaluated students' responses according to their ability to propose responsible actions toward environmental conservation rather than merely identifying environmental problems. Furthermore, students were encouraged to explain practical actions such as reducing waste, maintaining classroom cleanliness, conserving water, and protecting public facilities as part of their responses to environmental scenarios. Interview data indicated that teachers regarded these behaviours as important indicators of successful learning. Additionally, the documentary evidence demonstrated that classroom activities regularly required students to develop recommendations for improving environmental practices within their school and community environments (IET1).

The findings further showed that assessment consistently incorporated opportunities for students to exercise ethical judgement when responding to environmental issues. Moreover, rather than accepting single correct answers, teachers encouraged students to compare alternative actions, justify their decisions, and explain the consequences of different environmental behaviours. Classroom observations documented frequent use of contextual scenarios, which required students to consider the social and moral implications of environmental decisions before reaching conclusions. Additionally, interview participants explained that these assessment tasks enabled students to reflect upon the ethical dimensions of environmental issues. This was achieved while they demonstrated their reasoning through classroom discussion and written responses (IET3). Furthermore, students' written work similarly showed that many assessment tasks required explanation and justification rather than factual recall. Therefore, this indicates that ethical reasoning formed a regular component of classroom assessment.

Another prominent finding was the assessment of stewardship and sustainable behaviour through authentic classroom activities. Observation data revealed that teachers assessed students' participation in maintaining classroom cleanliness, managing waste appropriately, and contributing to environmental initiatives conducted within the school. Furthermore, these behavioural observations complemented oral and written assessments by providing opportunities for teachers to evaluate how students applied classroom learning in practice. Interview participants described these activities as important because, in their view,

environmental learning should be reflected in students' everyday actions rather than remaining at the level of theoretical understanding (IET2). Additionally, documentary evidence, including lesson plans, students' worksheets, and School-Based Assessment records, confirmed that behavioural participation and environmental responsibility were incorporated into classroom assessment alongside cognitive achievement, thereby highlighting a comprehensive approach to evaluation.

Taken together, the triangulated findings demonstrate that classroom assessment consistently integrated environmental knowledge with students' responsibility, ethical decision-making, stewardship, and sustainable behaviour. Across interviews, classroom observations, and documentary evidence, assessment practices were implemented through authentic environmental contexts, which required students not only to understand environmental issues but also to demonstrate responsible actions and justify their decisions within Islamic Education lessons. These findings, therefore, distinguish the assessment practices observed in this study from approaches that focus exclusively on measuring environmental knowledge, by illustrating how teachers assessed both students' understanding and their application of environmental values in classroom learning.

Assessment as a Means of Cultivating Moral Reasoning and Responsible Behaviour

Analysis of interview, classroom observation, and documentary data consistently revealed that classroom assessment was used to evaluate students' ethical reasoning alongside their cognitive understanding of environmental issues. Moreover, across all participating teachers, assessment activities required students not only to identify appropriate environmental practices but also to justify their decisions using reasoned arguments and examples drawn from everyday life. Interview participants explained that students were encouraged to explain why particular actions were considered appropriate or inappropriate; additionally, classroom observations showed that teachers frequently extended students' responses through follow-up questions that required them to defend their opinions and consider the consequences of alternative actions (IET3). Documentary evidence, including lesson plans and assessment tasks, similarly demonstrated that assessment activities were designed to elicit explanation, justification, and reflection rather than short factual responses.

Likewise, a recurring finding concerned teachers' emphasis on ethical decision-making during classroom assessment. Observation data showed that students were regularly presented with authentic environmental situations involving issues such as waste disposal, water conservation, public cleanliness, and the responsible use of school facilities. Rather than asking students to identify correct answers alone, teachers encouraged them to evaluate different courses of action, compare possible consequences, and justify the decisions they considered most appropriate. Interview participants explained that these classroom activities enabled them to observe students' reasoning processes and assess how learners arrived at their decisions rather than simply evaluating the final response. Assessment documents further confirmed that many classroom tasks required students to provide written explanations and supporting arguments for their chosen solutions.

The findings showed assessment is linked to students' responsible behaviour in class. Observations noted teachers monitored participation, cooperation, respect for rules, and engagement in environmental activities as ongoing assessment. Students involved in maintaining cleanliness, working on environmental projects, or showing responsibility during discussions were recognized for positive outcomes. Teachers confirmed these actions reflect understanding by applying classroom learning in real situations (IET1). Records and checklists also tracked participation, cooperation, responsible conduct, and academic performance.

Across all three cases, evidence from interviews, classroom observations, and documentary analysis demonstrated that classroom assessment consistently extended beyond measuring students' mastery of environmental knowledge. Teachers evaluated how students analysed situations, justified ethical choices, interacted with others, and demonstrated responsible behaviour during learning activities. The convergence of these data sources indicates that ethical decision-making and responsible action formed integral components of classroom assessment throughout the instructional process, complementing students' cognitive achievement and providing a broader picture of learning outcomes within Islamic Education classrooms.

Classroom Assessment Fostering Cognitive, Socio-Emotional, and Behavioural Competencies

Classroom assessment strategies observed through interviews, classroom observations, and instructional documents consistently fostered multifaceted learning. Instead of solely measuring academic achievement, teachers designed assessment activities that encouraged students to analyze environmental issues, reflect on their personal and religious responsibilities, and suggest practical solutions to environmental challenges. This pattern was consistently observed across all participating classrooms, indicating that assessment activities extended beyond measuring knowledge acquisition to include students' reflection and application of learning in authentic contexts.

Besides, the triangulated results indicated that students developed their cognitive skills by engaging in assessment tasks that involved investigating environmental problems, determining their causes, evaluating alternative solutions, and justifying their conclusions. Observations in the classroom revealed that teachers frequently introduced authentic environmental scenarios, such as waste management, water conservation, and environmental cleanliness, and then prompted students to analyze the underlying issues and propose suitable responses. Interview participants explained that they intentionally designed assessment tasks to determine whether students could apply classroom knowledge to unfamiliar situations rather than merely reproduce factual information (IET2). Documentary evidence further confirmed this pattern, with lesson plans, worksheets, and examination papers consistently incorporating contextualised questions that required explanation, reasoning, and problem-solving.

The findings also revealed that classroom assessment promoted students' socio-emotional competencies through opportunities for reflection and dialogue. Observation data demonstrated that students were encouraged to express their opinions, consider different viewpoints, and reflect on the consequences of environmental actions for themselves, their communities, and future generations. Furthermore, teachers frequently facilitated discussions that invited students to relate environmental issues to Islamic teachings and their own daily experiences. Supporting these observations, interview data revealed that reflection was viewed as an important component of assessment because it enabled students to examine their personal responsibilities and appreciate the broader social implications of environmental problems. Additionally, students' written reflections similarly demonstrated thoughtful consideration of environmental responsibility and personal commitment to sustainable practices.

A recurring observation was the development of behavioral competencies through the assessment of students engaged in real-world environmental activities. Classroom observations revealed that teachers consistently monitored students' efforts in maintaining cleanliness, participating in environmental projects, conserving resources, and collaborating during group tasks. These observations formed part of ongoing classroom assessment alongside oral questioning and written assignments. Interview participants explained that responsible

behaviour provided valuable evidence of students' learning because environmental understanding should be reflected in everyday actions (IET1). Documentary evidence, including classroom assessment records and observation checklists, likewise included indicators related to participation, responsibility, cooperation, and the practical application of learning during classroom activities.

Taken together, evidence from interviews, classroom observations, and document analysis demonstrates that classroom assessment simultaneously engaged students in analysing environmental problems, reflecting on their personal and religious responsibilities, and proposing or demonstrating practical actions within authentic learning contexts. Across the participating classrooms, assessment consistently integrated cognitive engagement, reflective thinking, and behavioural participation throughout the learning process, indicating that students were evaluated not only on what they knew but also on how they interpreted environmental issues and applied their learning in meaningful situations. These findings provide the empirical basis for interpreting classroom assessment as contributing to broader educational competencies in the subsequent Discussion section.

A Conceptual Model of HOTS Assessment in Islamic Environmental Education

The assessment of HOTS in Islamic Environmental Education is a cohesive pedagogical process that integrates higher-order thinking with ethical development and responsible environmental behavior. Instead of functioning as standalone activities, oral questioning, written assignments, and behavioral observations work together as complementary elements within a unified classroom assessment system. The triangulated findings from interviews, classroom observations, and document analysis collectively support this interconnected approach. Across the three participating teachers, assessment consistently progressed from students' engagement with authentic environmental problems to reflection on Islamic values and finally to the demonstration of responsible actions in everyday school contexts. This recurring pattern across multiple data sources formed the basis for the conceptual model presented in Figure 1.

Subsequently, the findings demonstrate that classroom assessment was initiated through authentic environmental issues that required students to analyse problems, evaluate alternative responses, and propose practical solutions during oral discussions, written assessments, and classroom activities. Moreover, observation data showed that teachers frequently used contextual environmental situations to stimulate students' reasoning. Additionally, interview participants explained that authentic situations enabled them to assess students' thinking processes rather than simply memorising content. Documentary evidence further confirmed that lesson plans and assessment tasks consistently integrated environmental scenarios requiring explanation, justification, and problem-solving. Together, these findings indicate that authentic assessment served as the primary mechanism through which higher-order cognitive processes were elicited during classroom learning.

The data further revealed that higher-order thinking was consistently accompanied by opportunities for students to reflect upon Islamic teachings and their personal responsibilities toward the environment. Across all three classrooms, students were encouraged to justify their decisions using Islamic principles, consider the ethical implications of environmental problems, and evaluate appropriate actions before reaching conclusions. Observation records demonstrated that teachers continuously prompted students to explain the moral basis of their responses, while interview data indicated that ethical reasoning was considered an essential component of successful learning. Documentary evidence similarly showed that lesson objectives and assessment criteria incorporated environmental responsibility alongside cognitive

achievement, indicating that assessment simultaneously evaluated intellectual understanding and ethical judgement.

In addition, classroom observations revealed that assessments went beyond students' oral and written responses. They also included students' active participation in maintaining cleanliness, managing waste responsibly, conserving resources, and engaging in environmental activities within the school. A recurring finding was the challenge of translating students' reasoning into observable environmental behaviors. Interview participants consistently explained that students' understanding of Islamic teachings should be reflected in everyday behaviour rather than remaining as theoretical knowledge. This pattern was corroborated by classroom assessment records and observation checklists, which included indicators related to participation, responsibility, and environmental practice. The convergence of evidence across interviews, observations, and documents therefore indicates that classroom assessment progressed from higher-order thinking to ethical reflection and ultimately to responsible environmental action.

These interconnected findings are synthesised into the conceptual model presented in Figure 1, which illustrates the sequence of pedagogical processes identified across the participating classrooms.

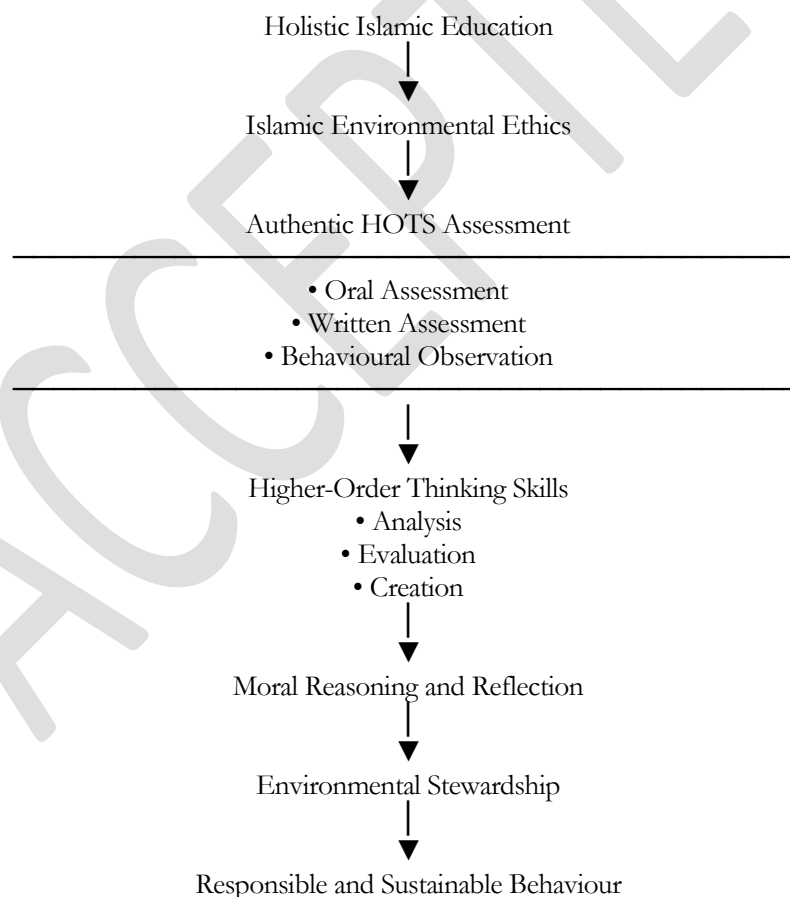


Figure 1. Conceptual model illustrating the progression of HOTS assessment in Islamic Environmental Education derived from the triangulated findings of interviews, classroom observations, and document analysis.

The findings, as captured in Figure 1, indicate that HOTS assessment in Islamic Education functions as a holistic pedagogical process rather than a mechanism for measuring

cognitive achievement alone. Across interviews, classroom observations, and documentary evidence, teachers consistently embedded assessment within everyday instruction to encourage intellectual engagement, ethical reflection, and environmentally responsible behaviour. This finding supports the philosophical orientation of Holistic Islamic Education, which conceptualizes education as the balanced development of the intellectual, spiritual, moral, and social dimensions of the learner rather than the transmission of disciplinary knowledge alone (Al-Attas, 1980; Lenggulung, 1988). Within this perspective, assessment is not merely evaluative but educational, serving as a means of cultivating character while simultaneously strengthening students' reasoning and judgement.

This finding also extends contemporary discussions on assessment by demonstrating that authentic classroom assessment can simultaneously support learning and character development. Wiggins (1998) argues that authentic assessment should evaluate students' capacity to apply knowledge within meaningful contexts rather than reproduce isolated facts. The present study expands this proposition by showing that, in Islamic Education, authenticity encompasses not only contextual problem solving but also moral reflection grounded in religious values. Consequently, assessment becomes an integral component of pedagogical practice through which students learn to connect intellectual inquiry with ethical responsibility. This broader conceptualization contributes to Islamic education scholarship by illustrating how assessment can operationalize the holistic aims of Islamic pedagogy within everyday classroom practice.

The findings further demonstrate that oral questioning, written assessment, and classroom observation consistently required students to analyse environmental issues, evaluate alternative responses, and formulate practical solutions rather than merely recall factual information. These findings align closely with Bloom's Revised Taxonomy, particularly the higher cognitive processes of analysis, evaluation, and creation (Anderson & Krathwohl, 2001). Teachers deliberately employed authentic environmental scenarios to stimulate reasoning, requiring students to interpret complex situations before justifying their decisions. Such assessment practices reflect a shift from content reproduction toward inquiry-oriented learning that characterizes contemporary competency-based education.

Using authentic environmental contexts reinforces Authentic Assessment principles by integrating assessment into classroom dialogue, collaborative problem solving, reflective writing, and contextual case analysis. These practices help students demonstrate transferable reasoning skills in real-world-like situations. The findings indicate that authentic assessment aligns well with Islamic Education, enabling students to combine religious knowledge with practical judgment on social and environmental issues. This study broadens HOTS research, often centered on science or math, by showing how authentic assessment fosters higher-order thinking in value-based educational settings.

One of the most significant findings is that environmental assessment was not confined to evaluating students' ecological knowledge but also examined their ethical judgement, stewardship, and responsible behaviour. Students were consistently required to justify environmental decisions using Islamic principles while demonstrating responsibility through classroom participation and everyday environmental practices. These findings align with the principles of Islamic Environmental Ethics, which promote ethical responsibility, environmental stewardship, and a balanced relationship between humans and the natural environment (Foltz et al., 2003; Nasr, 1996; Rekan & Mokhtar, 2025).

Unlike many environmental education studies that primarily assess scientific understanding or environmental awareness (Al-Barakat et al., 2025; Ardoin et al., 2019; Lee, 2023; Perea et al., 2025), the present findings indicate that Islamic Education integrates ethical accountability directly into classroom assessment. Assessment therefore becomes a mechanism

for evaluating not only what students know about environmental sustainability but also how they reason ethically and apply religious values when making environmental decisions. This finding contributes to the growing literature on Islamic education by demonstrating that environmental ethics can be operationalized through assessment practices rather than remaining solely within curriculum content. Consequently, the study broadens current understandings of HOTS assessment by positioning ethical judgement as an inseparable dimension of higher-order thinking within Islamic educational settings.

The findings further reveal that classroom assessment simultaneously developed students' cognitive, socio-emotional, and behavioural competencies through authentic environmental learning activities. Students analysed environmental problems, reflected upon their responsibilities from Islamic perspectives, and proposed or demonstrated practical actions for environmental improvement. This multidimensional pattern closely corresponds with the three learning domains proposed by Education for Sustainable Development (ESD), namely cognitive learning, socio-emotional learning, and behavioural learning (UNESCO, 2017).

The study therefore demonstrates how Islamic Education provides an effective pedagogical context for implementing ESD through classroom assessment. Rather than treating sustainability as an additional curriculum topic, participating teachers integrated environmental issues into ongoing assessment activities that encouraged critical thinking, ethical reflection, and responsible action simultaneously. This integration suggests that Islamic educational philosophy and ESD are mutually reinforcing rather than conceptually separate. Islamic concepts of stewardship and responsibility provide a moral foundation for sustainability education, while ESD offers a contemporary educational framework through which these values can be enacted in classroom practice. Accordingly, the study contributes to international debates on sustainability education by illustrating how religious education can meaningfully support global sustainability goals without compromising its own philosophical foundations.

The conceptual model developed from the triangulated findings provides a theoretical contribution by illustrating the sequential relationship between Islamic educational philosophy, authentic assessment, higher-order thinking, moral reasoning, environmental stewardship, and responsible behaviour. Existing studies have largely examined teachers' readiness to implement HOTS or the challenges associated with integrating higher-order thinking into Islamic Education (Adam & Abdul Latif, 2018; Ahmad et al., 2020; Ajmain et al., 2024; Alotaibi, 2024; Masran & Esha, 2018; Sarkawi, 2023). In contrast, the present study proposes an empirically grounded model explaining how classroom assessment functions as the pedagogical mechanism linking these educational outcomes.

The proposed model suggests that authentic assessment provides the instructional pathway through which students first engage in analytical and evaluative thinking before progressing toward ethical judgement and environmentally responsible action. Rather than conceptualizing higher-order thinking as a purely cognitive construct, the model positions HOTS within a broader process of holistic learner development that integrates intellectual competence with moral responsibility. This reconceptualization represents an important theoretical advancement for Islamic education because it demonstrates that assessment can simultaneously serve cognitive, ethical, and sustainability-oriented purposes. The model also provides a transferable framework for future studies examining assessment practices across diverse Islamic educational contexts and contributes to ongoing international discussions concerning the integration of values-based education, authentic assessment, and sustainable development.

CONCLUSION

This study demonstrates that Higher Order Thinking Skills (HOTS) assessment in Islamic Environmental Education extends beyond evaluating students' cognitive achievement to function as a holistic pedagogical process that integrates higher-order thinking, moral reasoning, and environmentally responsible behaviour. Through authentic oral, written, and behavioural assessment, teachers consistently engaged students in analysing environmental problems, reflecting on Islamic values, and proposing or demonstrating sustainable actions within meaningful learning contexts. The findings suggest that effective HOTS assessment in Islamic Education is grounded not only in cognitive complexity but also in the cultivation of ethical judgement and environmental stewardship, reflecting the holistic aims of Islamic education. By integrating Islamic Educational Philosophy, Islamic Environmental Ethics, Authentic Assessment, Bloom's Revised Taxonomy, and Education for Sustainable Development into a single conceptual model, this study contributes a theoretically grounded framework that explains how classroom assessment can simultaneously foster intellectual, moral, and sustainability competencies. These findings provide practical implications for curriculum developers, teacher educators, and policymakers seeking to strengthen assessment practices that align Islamic educational values with contemporary educational priorities and the global sustainability agenda. Future research should examine the applicability of the proposed conceptual model across diverse Islamic educational contexts and employ comparative or mixed-methods approaches to further validate its effectiveness in promoting holistic student development.

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