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Inquiry Learning Model in Improving Higher Order Thinking Skills (HOTS) Abilities in Madrasah Ibtidaiyah

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ABSTRACT. Education is an activity to increase person's general knowledge including increasing mastery of theory and skills, deciding and finding problems solutions related to activities in achieving their goals, whether problems in the world of education or everyday life. If formal education in an organization is process of developing abilities in the direction desired by the organization concerned. High Order Thinking Skills (HOTS) are also implemented by the government following still low ranking of the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) compared to other countries, so that educational standards both in learning process and assessment are further improved by the government through the 2013 curriculum. (Ariyana et al., 2018). According to the revised Bloom's Taxonomy, cognitive processes are divided into two, there are high-level thinking skills or often referred as Higher Order Thinking Skill (HOTS), and low-level thinking skills Lower Order Thinking Skill (LOTS). Low-level thinking skills involve the ability to remember (C1), understand (C2) and apply (C3) while high-level thinking skills involve analysis and synthesis (C4), evaluate (C5), and create or creativity (C6). (Nugroho, 2018). When children have high-level thinking skills in learning process using inquiry that provokes or stimulates students' thinking to develop more analytical, evaluation and creative abilities in children. Students' ability to solve high-level thinking problems can be used by teachers to find out whether students already have high-level thinking skills in learning activities. HOTS-based learning can also provide benefits to students, there are improving achievement, increasing motivation and increasing positive attitudes.

Keywords: *High Order Thinking Skills, Ability, Inquiry Learning Model.*

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INTRODUCTION

Education is expected to prepare students not only to acquire knowledge but also to use that knowledge to understand problems and respond thoughtfully to the situations they encounter. In contemporary society, students need opportunities to examine information, consider different perspectives, make reasoned judgments, and develop ideas that are relevant to their lives. Accordingly, learning should extend beyond the memorization of facts and the reproduction of information. It should also encourage students to question, investigate, and apply

their understanding in meaningful contexts. These expectations highlight the importance of developing higher-order thinking skills (HOTS) as an integral part of the learning process.

Higher-order thinking involves the ability to analyze, evaluate, and create rather than merely recall and understand information. Analysis enables students to identify relationships, distinguish relevant information, and examine the underlying causes of a problem. Evaluation requires students to assess ideas, evidence, or possible solutions using appropriate criteria. Creativity involves bringing together knowledge and ideas to develop new explanations, approaches, or products. In the context of everyday life, these abilities can help students examine social issues, assess the consequences of actions, and propose solutions that respond to the needs of their communities. Therefore, the development of HOTS should be understood not simply as preparation for academic assessment, but also as an educational objective connected to students' participation in society.

Achieving this objective requires learning activities that provide sufficient opportunities for students to engage in reasoning. Students need to do more than receive explanations and reproduce the information presented by their teachers. They also need to ask questions, explore problems, compare evidence, explain their conclusions, and reflect on the strengths and limitations of their ideas. For this reason, the selection of an appropriate learning method is an important consideration in instructional planning. The chosen method should connect the intended learning objectives with the activities students undertake and the ways in which their learning is assessed.

A method can be understood as a systematic way of carrying out activities to achieve a particular goal (Siagian et al., 2021). In an educational setting, a learning method refers to the procedures used by educators to present learning materials and organize teaching and learning activities so that the intended competencies or objectives can be achieved (Nurhayati, 2016). The selection of a learning method should therefore consider not only the content being taught but also the thinking processes that students are expected to develop. When learning objectives emphasize analysis, evaluation, and creativity, the instructional approach should give students opportunities to practice these processes throughout the lesson.

One approach relevant to these objectives is guided inquiry learning. In this study, guided inquiry is used to position students as active participants in constructing their understanding while maintaining the teacher's role in providing direction and support. Learning activities are organized around questions or problems that students investigate through observation, information gathering, discussion, and the development of explanations. Rather than presenting all conclusions at the beginning of a lesson, the teacher guides students through questions and activities that encourage them to examine the available information and formulate their own conclusions. The emphasis is therefore placed on both the knowledge students acquire and the reasoning they use to develop that knowledge.

The guided element is particularly important because the expectation that students think independently does not mean that they must learn without assistance. Teachers can support the inquiry process by clarifying the problem, helping students identify relevant information, and asking questions that encourage further reasoning. Such guidance should help students move beyond unsupported answers toward explanations that are connected to evidence. At the same time, students should have opportunities to discuss alternative interpretations, reconsider their initial assumptions, and communicate the reasons behind their conclusions. In this way, guided inquiry provides a framework for integrating teacher support with active student participation.

The relationship between guided inquiry and HOTS can be examined through the intellectual demands of inquiry activities. When students investigate a problem, they are required to analyze information and identify relationships among ideas or observations. When they compare explanations or consider whether the available evidence supports a conclusion, they

engage in evaluation. When they develop a proposed solution, formulate an explanation, or design a product in response to a problem, they engage in creative thinking. However, these processes need to be deliberately incorporated into the learning activities. Inquiry tasks should not stop at collecting information; they should also require students to interpret, justify, and use that information.

Previous research provides a basis for further examining inquiry-oriented learning and higher-order thinking. Astuti (2020) reported a significant improvement in science learning outcomes through the application of an inquiry learning model at SDN 07 Central Bengkulu. Meanwhile, Azmi (2020) reported a significant positive influence of HOTS-oriented learning on students' critical thinking in Islamic Religious Education. Although these studies address different learning contexts and outcomes, they provide relevant starting points for considering how instructional activities can move beyond knowledge acquisition toward more demanding forms of thinking. Nevertheless, improvements in general learning outcomes should be distinguished from improvements in specific HOTS dimensions. This distinction makes it important to examine students' analytical, evaluative, and creative abilities explicitly.

Assessment is therefore an essential component of learning designed to develop HOTS. If the learning objectives emphasize higher-order thinking, assessment tasks should give students opportunities to demonstrate reasoning rather than only recall information. For example, students may be asked to interpret a situation, compare alternative solutions, evaluate a claim, or propose an idea supported by a clear explanation. Assessment should also consider how students arrive at an answer, including the evidence they select and the justification they provide. In this study, assessment is consequently positioned as a means of examining the extent to which the intended thinking processes are reflected in students' responses.

Based on these considerations, the present study focuses on the application of guided inquiry learning to support the development of students' higher-order thinking skills, particularly their ability to analyze, evaluate, and create. The study seeks to examine the relationship between the learning opportunities provided through guided inquiry and the thinking skills demonstrated by students. By aligning learning objectives, inquiry activities, and assessment, this research is expected to contribute to the development of more purposeful learning practices that encourage students to use knowledge critically and creatively in contexts relevant to their lives.

METHOD

This study adopted a library research method with a qualitative literature review approach to examine the role of guided inquiry learning in supporting students' higher-order thinking skills (HOTS). The review focused on three dimensions of HOTS: analyzing, evaluating, and creating. Rather than collecting primary data through classroom interventions, the study examined theoretical perspectives and empirical findings reported in existing publications. A literature review was considered appropriate for identifying, comparing, and synthesizing knowledge relevant to the research objectives (Snyder, 2019).

The review addressed the following questions: (1) How does the literature explain the relationship between guided inquiry learning and students' analytical, evaluative, and creative thinking? (2) What forms of teacher guidance and student learning activities are described as supporting these thinking processes? and (3) How are higher-order thinking skills assessed in the reviewed studies? These questions connected the review to the learning objectives, instructional processes, and assessment considerations discussed in the introduction.

The study drew on published literature addressing guided inquiry learning, higher-order thinking skills, and learning assessment. The sources included peer-reviewed journal articles and relevant academic books. Empirical studies were examined to identify reported learning processes

and outcomes, while theoretical and methodological publications were used to clarify concepts and support the interpretation of findings.

Literature relevant to the research objectives was identified using combinations of terms related to "guided inquiry," "guided inquiry learning," "inquiry-based learning," "higher-order thinking skills," "HOTS," "analytical thinking," "evaluative thinking," and "creative thinking." Corresponding Indonesian terms, including "inkuiri terbimbing" and "keterampilan berpikir tingkat tinggi," were also relevant to identifying literature within the Indonesian educational context.

The selection of sources was based on their relevance to the research questions and the adequacy of the information available for analysis. Priority was given to publications that explained the characteristics of guided inquiry, described students' engagement in higher-order thinking, or reported assessment practices related to analysis, evaluation, and creation. Publications addressing general inquiry-based learning were considered only when their descriptions of teacher guidance and student activities were relevant to the focus of the review. Duplicate publications and sources that did not directly address the research objectives were excluded.

The selected publications were critically examined before their findings were incorporated into the synthesis. For empirical studies, attention was given to the research objectives, educational context, research design, learning activities, assessment instruments, findings, and limitations. For theoretical publications, the evaluation focused on conceptual clarity, the coherence of the arguments, and their relevance to guided inquiry and HOTS. This evaluation helped distinguish conceptual explanations from findings supported by empirical investigation. The importance of evaluating different types of evidence before synthesizing them is emphasized by Whittemore and Knafl (2005).

Relevant information was organized in a literature review matrix. The extracted information included author and publication year, study purpose, educational setting, methodological approach, characteristics of guided inquiry, forms of teacher support, HOTS dimensions examined, assessment procedures, principal findings, and limitations. This organization facilitated comparison across publications and maintained a clear relationship between the reviewed evidence and the interpretations developed in the study.

The literature was analyzed using qualitative thematic synthesis. The analysis began with close reading to identify statements and findings relevant to the research questions. The extracted information was then grouped into themes concerning the characteristics of guided inquiry, teacher guidance, student investigation, analytical thinking, evaluative thinking, creative thinking, and HOTS assessment.

Within these themes, the analysis examined how the reviewed publications connected learning activities with particular thinking processes. Activities involving the identification of relationships, interpretation of information, and examination of evidence were considered in relation to analytical thinking. Activities involving judgments about explanations, evidence, or alternative solutions were examined in relation to evaluative thinking. Activities involving the development of explanations, proposed solutions, or products were examined in relation to creative thinking. These categories served as an analytical framework rather than an assumption that every inquiry activity necessarily developed all three HOTS dimensions.

The synthesis also compared similarities, differences, and limitations across the reviewed publications. Particular attention was given to whether a study directly assessed higher-order thinking or reported broader outcomes, such as academic achievement. Improvements in general learning outcomes were therefore not automatically interpreted as improvements in analytical,

evaluative, or creative abilities. Findings were interpreted in relation to the educational context, the nature of teacher guidance, and the assessment methods described in each publication.

The interpretation of the literature was guided by the relevance and strength of the evidence presented in the selected publications. Supporting findings, contrasting findings, and methodological limitations were considered to avoid presenting guided inquiry as uniformly effective across educational contexts. The results were organized into a narrative synthesis that addressed the research questions and clarified the relationship between learning objectives, inquiry activities, and HOTS assessment. This emphasis on transparent interpretation and synthesis is consistent with the methodological principles discussed by Snyder (2019) and Whittemore and Knafl (2005).

As a library-based study, this research did not independently measure changes in students' thinking skills or test the causal effects of guided inquiry learning. Its contribution was to synthesize existing explanations and findings, identify instructional and assessment considerations relevant to HOTS, and highlight issues requiring further empirical investigation.

The method section describes the steps that were passed in executing the research or study. Therefore, it is necessary to show in detail to the reader why the method used is reliable and valid in presenting research findings. The research methods section should be able to explain the research methods used, including how the procedures are implemented, an explanation of the tools, materials, media or instruments used, an explanation of the research design, population and sample (research targets), data collection techniques, instrument development, and technique of data analysis. Writing subtitles in the method should be included in the paragraph instead of bullets, or numbering.

For qualitative research such as classroom action research, case studies, etc., it is necessary to add the presence of researchers, research subjects, and informants who helped along with ways to explore research data, location and duration of research as well as a description of checking the validity of research results.

RESULT AND DISCUSSION

Result

The literature-based synthesis positions guided inquiry as an instructional approach that combines students' active investigation with structured teacher support. Students participate in formulating questions, examining information, interpreting evidence, and developing explanations, while teachers provide guidance to maintain the direction and intellectual purpose of the learning process. Within this approach, student-centered learning does not mean the absence of instruction. Instead, the teacher supports students in undertaking reasoning processes without supplying every decision or conclusion.

Pedaste et al. (2015) identify five general phases of inquiry-based learning: orientation, conceptualization, investigation, conclusion, and discussion. Orientation introduces a phenomenon or problem that stimulates curiosity. Conceptualization involves formulating questions or hypotheses that establish the direction of the investigation. Investigation encompasses exploration or experimentation and the interpretation of data. Conclusion involves relating the findings to the original question or hypothesis. Discussion incorporates communication and reflection, which may occur throughout the inquiry process rather than exclusively at its end. These phases provide a framework for examining where higher-order thinking may be encouraged within guided inquiry.

The relationship among these phases is not necessarily linear. An investigation may lead students to revise an initial question, while discussion may reveal weaknesses in an explanation and encourage further examination of the evidence. Inquiry can therefore involve movement between phases as students reconsider their interpretations. This flexibility is important because it places emphasis on the development and refinement of understanding rather than the completion of a fixed sequence of activities.

The conceptual framework examined in this review emphasizes intellectual development, interaction, questioning, deliberate engagement in thinking, and openness to alternative explanations. These principles are interpreted as instructional considerations for designing inquiry activities, rather than as evidence that higher-order thinking has already developed.

Intellectual development directs attention toward the quality of students' reasoning, including how they interpret information and justify conclusions. Interaction provides opportunities to communicate ideas and examine alternative interpretations. Questioning helps focus attention on the problem, the evidence required to investigate it, and the assumptions underlying possible explanations. Deliberate engagement in thinking requires tasks that extend beyond reproducing information, while openness allows students to consider different possibilities within the boundaries of evidence and the learning objectives.

These considerations are reflected in the inquiry framework through the relationship between investigation, communication, and reflection. Students need opportunities not only to obtain information but also to discuss its meaning and reconsider their decisions. Consequently, the completion of a practical activity is not, by itself, sufficient to establish that meaningful inquiry has occurred. The intellectual purpose of the activity must remain visible in the questions students address and the explanations they construct.

The HOTS framework adopted in this study consists of analyzing, evaluating, and creating. In the revised Bloom's taxonomy, analyzing includes differentiating, organizing, and attributing; evaluating includes checking and critiquing; and creating includes generating, planning, and producing. These categories provide a basis for distinguishing the cognitive demands of learning tasks and examining the reasoning expected from students.

Analyzing involves identifying relevant components of information and determining their relationships. Differentiating concerns distinguishing relevant from irrelevant information. Organizing involves identifying how elements fit into a structure or explanation. Attributing concerns identifying an underlying viewpoint, intention, or assumption. Within guided inquiry, these processes may be expressed when students select observations relevant to a question, organize findings into patterns, or examine the assumptions behind a proposed explanation.

Evaluating involves making judgments using criteria or standards. Checking concerns identifying inconsistencies within a procedure, explanation, or conclusion, while critiquing involves judging an outcome or process against relevant criteria. In inquiry learning, students may demonstrate these processes by examining whether a conclusion follows from the evidence, assessing the adequacy of an investigation, or comparing alternative explanations.

Creating involves bringing elements together to form a coherent or functional whole. Generating concerns proposing possible explanations or hypotheses, planning involves designing a procedure or solution, and producing involves carrying out a plan to develop an outcome. Such an outcome may be an investigation design, an explanatory model, a proposed solution, or a physical product. The cognitive demand depends on the reasoning and decisions involved, not simply on whether students make an object.

Figure 1 presents a conceptual framework linking guided inquiry phases with opportunities to engage in higher-order thinking. The inquiry structure is adapted from Pedaste et al. (2015), while the cognitive processes are organized according to the revised Bloom's taxonomy. The framework also identifies teacher guidance and assessment as considerations that connect instructional activities with the intended thinking processes.

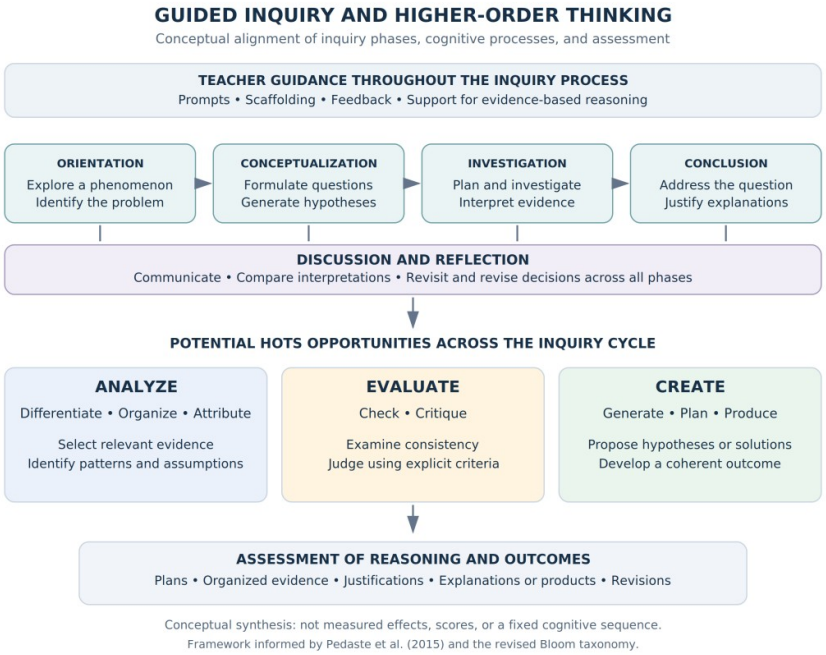


Figure 1 Conceptual framework linking guided inquiry learning with higher-order thinking skills and assessment.

As illustrated in Figure 1, orientation provides a context for identifying a problem and distinguishing relevant information. Conceptualization creates opportunities to formulate questions, examine assumptions, and generate hypotheses. Investigation may involve planning procedures, organizing observations, interpreting evidence, and checking the consistency of decisions. Conclusion requires students to relate their findings to the initial question and justify their explanations. Discussion and reflection connect these activities by allowing students to compare interpretations and reconsider their reasoning.

These relationships represent potential instructional opportunities rather than a fixed correspondence between one inquiry phase and one HOTS dimension. Creating may begin during conceptualization through hypothesis generation, while evaluating may occur during planning, investigation, and conclusion. Similarly, analysis may be necessary whenever students reconsider the relevance or organization of information. The arrows in the diagram therefore indicate conceptual relationships, not measured effects or an automatic progression in students' abilities. This interpretation is consistent with the flexible inquiry pathways described by Pedaste et al. (2015).

Discussion

The conceptual relationship between guided inquiry and HOTS lies in the intellectual work required to investigate a question and develop an evidence-supported explanation. Inquiry provides a structure in which students can move from encountering a problem to examining information and defending a conclusion. However, the presence of an inquiry activity does not automatically establish that students have engaged in analysis, evaluation, and creation.

The inquiry cycle is particularly relevant because its phases connect questions, evidence, interpretations, and conclusions. Conceptualization establishes what needs to be investigated, investigation provides information for interpretation, and conclusion requires a response to the original question. Communication and reflection allow these decisions to be examined and revised. Together, these connections explain how inquiry can provide opportunities for higher-order thinking, provided that the tasks require students to undertake the corresponding cognitive processes.

For instructional planning, this distinction means that performing an experiment should not be treated as equivalent to analyzing or evaluating. Students who follow a complete procedure and reproduce an expected conclusion may have limited opportunities to make substantive decisions. A more explicit HOTS-oriented task could ask students to justify the information they select, explain relationships among observations, compare possible explanations, or propose improvements to an investigation. These examples illustrate how the intellectual demand can be strengthened through task design rather than through the inquiry label alone.

Teacher guidance is central to interpreting the potential contribution of inquiry-based learning. In their meta-analysis of 72 studies, Lazonder and Harmsen (2016) found positive overall effects of guidance on inquiry learning activities, performance success, and learning outcomes. This finding supports the inclusion of assistance within inquiry-based learning rather than the assumption that students should investigate entirely without support. Nevertheless, the outcomes examined in that meta-analysis should not automatically be interpreted as direct measures of all three HOTS dimensions considered in the present review.

In the proposed framework, guidance supports students' participation without replacing their responsibility for reasoning. For example, a teacher may help students clarify a question while allowing them to propose explanations, or provide criteria for evaluating evidence without determining the conclusion in advance. The relevant instructional issue is therefore not simply whether the teacher is active or passive, but which decisions are supported and which remain the responsibility of students.

This interpretation also avoids presenting independence as an immediate requirement for every learner. The available evidence supports the value of guidance but does not establish one universally appropriate form or amount of assistance for all educational settings. Consequently, the relationship between guidance and independence should be considered in relation to the learning task and the outcomes being examined.

Questioning can make the reasoning expected in inquiry activities more explicit. At the orientation and conceptualization phases, questions may help students identify the problem and propose possible explanations. During investigation, they may direct attention toward the relevance, organization, and consistency of evidence. During conclusion and discussion, they may encourage students to examine whether their claims are justified. These proposed uses of questioning are consistent with an inquiry framework that integrates communication and reflection throughout the learning process.

Illustrative prompts include "Which observations are relevant to this explanation?", "What assumption does this claim depend on?", "Could another explanation account for the findings?", and "What change would improve the investigation?" Such prompts serve different purposes: some emphasize analysis, others require evaluation, and others invite the generation or planning of alternatives. Their value within the proposed framework is that they direct attention toward reasoning rather than the repetition of a predetermined answer.

Interaction provides a setting in which students can communicate and examine these ideas. However, participation in discussion should not be treated as sufficient evidence of higher-order

thinking. The quality of students' contributions must also be considered, including whether they refer to evidence, address alternative interpretations, and revise their explanations when necessary. Reflection similarly needs to concern specific decisions, assumptions, or limitations rather than only general impressions of the activity.

The creating dimension requires deliberate attention because it is not an inevitable final outcome of inquiry. In the revised taxonomy, creating includes generating, planning, and producing. Tasks intended to address this dimension should therefore provide opportunities for students to propose possibilities, make design decisions, and develop coherent outcomes. Within the conceptual framework, creation may occur when students generate hypotheses, design investigations, construct explanatory models, or propose solutions to a problem. A physical product is one possible outcome, but it is not the only form through which creating can be demonstrated. Likewise, producing an object does not necessarily demonstrate creative thinking if the ideas, procedures, and final specifications have all been supplied by the teacher.

The implication for task design is that assessment should examine the relationship between students' ideas, plans, and outcomes. A proposed solution, for example, can be considered in terms of how it addresses the identified problem and how its design is justified. This interpretation keeps the creating dimension connected to the intellectual demands of the task rather than equating it with novelty or visual presentation alone. Figure 1 places assessment alongside the inquiry process to emphasize that intended thinking skills need to be reflected in the evidence collected from students. Learning objectives focused on analysis require opportunities to distinguish relevant information and explain relationships. Objectives focused on evaluation require judgments supported by criteria. Objectives focused on creation require students to generate possibilities, develop plans, and produce coherent outcomes. These distinctions follow the cognitive processes identified in the revised Bloom's taxonomy.

A possible assessment approach would examine both the final outcome and selected evidence from the inquiry process. Investigation plans, organized observations, written justifications, responses to feedback, and revisions could help reveal how an explanation or product was developed. Within this approach, the quality of reasoning becomes visible rather than being inferred solely from the correctness of a final answer. Importantly, the opportunity to practice HOTS must be distinguished from demonstrated improvement in HOTS. Figure 1 identifies where particular thinking processes may be encouraged, but it does not show that students' abilities increased. Evidence of improvement would require empirical investigation using assessments appropriate to the intended cognitive processes. The present study provides a conceptual basis for such investigation rather than a direct measurement of its outcomes.

The synthesis clarifies how guided inquiry activities can be connected to analyzing, evaluating, and creating. It does not establish that guided inquiry is universally superior to other instructional approaches. Although the evidence reviewed by Lazonder and Harmsen (2016) supports the value of guidance within inquiry learning, those findings must be interpreted according to the learning outcomes actually assessed. Similarly, broader academic achievement should remain distinct from specific HOTS performance. A finding concerning overall learning outcomes cannot, by itself, establish improvement in analysis, evaluation, and creation. The contribution of the present review is therefore conceptual: it identifies relationships among inquiry phases, teacher support, cognitive demands, and assessment considerations. The framework can inform subsequent instructional planning and empirical research, but it should not be presented as a tested causal model.

CONCLUSION

This literature-based study identifies a conceptual alignment between guided inquiry learning and higher-order thinking skills, particularly analyzing, evaluating, and creating. The inquiry phases provide opportunities for students to formulate questions, investigate problems, interpret evidence, develop explanations, and reflect on their decisions. These opportunities are interconnected and may recur throughout the learning process rather than follow a fixed cognitive sequence. Analyzing involves differentiating relevant information, organizing relationships, and identifying underlying assumptions or viewpoints. Evaluating involves checking the consistency of procedures and explanations and critiquing them using relevant criteria. Creating involves generating possible explanations, planning investigations or solutions, and producing coherent outcomes. These processes need to be made explicit in both the design of inquiry activities and the assessment of students' work.

The conceptual framework presented in Figure 1 emphasizes the importance of connecting teacher guidance, inquiry activities, and assessment. Guidance should enable students to engage meaningfully with a problem while preserving their responsibility for interpreting evidence and justifying conclusions. Assessment should examine the reasoning underlying students' decisions and outcomes, rather than relying only on task completion or the appearance of a final product. As a library-based study, this research does not independently demonstrate an improvement in students' HOTS or establish the superiority of guided inquiry over other approaches. Its contribution is a conceptual framework for aligning inquiry learning with higher-order cognitive objectives. Further empirical research is needed to examine these relationships using assessments that distinguish analytical, evaluative, and creative performance.

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