

Fostering Critical Thinking Through Creative Teaching: A Comparative Case Study of Stand-Alone and Infused Approaches in Two Malaysian Classrooms

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Abstract

The decline of critical thinking in the modern world is a growing concern for educators, who increasingly ask how such thinking can be deliberately cultivated within existing school structures rather than left to chance. This study examines how two teachers in Malaysia use creative teaching to foster critical thinking and how their students respond through two contrasting approaches: a stand-alone method, in which critical thinking is taught as its own subject, and an infused method, in which it is embedded within an existing subject. Using a qualitative multiple case study design, the research followed two classrooms in the Kuala Lumpur area: an international school in Gombak that teaches critical thinking directly through Hikmah Pedagogy, a stand-alone Philosophy-for-Children-based approach, and a school in Ampang that follows a Saudi national curriculum and infuses critical thinking into its mathematics lessons using the Six Thinking Hats technique. Data were gathered through classroom observation, interviews with teachers and students, and content analysis and were evaluated against Duron et al.'s (2006) five-step framework for teaching critical thinking and Paul and Elder's (2002) model of critical thinking. Both teachers were found to align with all five steps of Duron et al.'s framework despite using different methods. Three factors emerged as central to how well critical thinking was fostered in either setting: the teacher's skill in questioning, the consistency with which critical thinking was practised over time, and the choice of stimulus material or anchor problems used to prompt it. Benefits reported by teachers and students included stronger academic reasoning and improved social skills, such as respectful disagreement, while the most significant constraint in both classrooms was insufficient lesson time to fully develop and assess every student's thinking.

Keywords: *Critical thinking skills, creative teaching, stand-alone approach, infused approach, Hikmah Pedagogy.*

INTRODUCTION

Creative teaching is rapidly gaining attention among educators at every level, from preschool to college. Kakar et al. (2020) argue that the more creatively a teacher approaches a lesson, the more successfully a child grasps the material. Because learners differ in how they interpret, reflect, and communicate, cultivating this variety of thought is central to how societies continue to progress intellectually. Employers, institutions, and public organisations increasingly seek individuals who can think critically to help drive projects forward, and critical thinking is now widely regarded as essential to effective communication and the exchange of ideas (Haber, 2020). In today's increasingly complex and challenging world, the ability to think critically is more crucial than ever.

Paudel and Shrestha (2024) suggest that classroom engagement and discussion meaningfully improve academic achievement, and Haber (2020) describes critical thinking as fostering the highest level of intellectual interaction between individuals. Much of the current research in education is therefore focused on developing teaching methods that cultivate critical thinkers and support what is often called a "community of inquiry" — a classroom culture in which students learn by questioning, reasoning, and building on one another's ideas. In many countries, however, this skill has been slow to enter classrooms, in part because students have historically been treated as passive recipients rather than active participants in their own learning. In Malaysia specifically, several studies report that students tend to favour rote memorisation over independent thinking, and that many approach learning primarily as a means of passing standardised tests rather than as a process of thinking and personal growth (Alotaibi & Ismail, 2024; Davies, 2019; Mahmood & Othman, 2020; Aldhafeeri & Alshammari, 2023).

This concern is reflected directly in national policy. A recent major focus on critical thinking is evident in the Malaysia Education Blueprint 2015-2025 (Ministry of Education Malaysia, 2015). The blueprint sets out its vision as follows:

“Every child will learn how to continue acquiring knowledge throughout their lives (instilling a love for inquiry and lifelong learning), to be able to connect different pieces of knowledge, and to create new knowledge. Every child will master a range of important cognitive skills, including critical thinking, reasoning, creative thinking, and innovation.” (p. 10)

This national emphasis is echoed in classroom-level research. Secadron and Tan (2023), for instance, found that Malaysian students using mathematics modules designed around critical thinking engaged in interpretation, analysis, and evaluation while building argumentative reasoning.

This study builds directly on Malaysia's national educational vision by examining two classrooms in the Kuala Lumpur area that take markedly different routes toward the same goal (i.e., enhancing students' critical thinking). The first is an international school in Gombak, where critical thinking is taught as its own subject through Hikmah Pedagogy, a stand-alone approach rooted in Philosophy for Children (P4C) (Lipman et al., 2010). The second is a school in Ampang that follows a Saudi national curriculum and instead infuses critical thinking into its regular mathematics lessons. This second setting matters for an additional reason: critical thinking was formally introduced into the Saudi curriculum in 2018, and early evaluations describe encouraging gains in students' tolerance and reasoning (Hamill-Stewart, 2021; Alharbi, 2022). Because one of the two classrooms in this study operates under that curriculum, its methods and challenges are shaped as much by Saudi curricular

reform as by the Malaysian schooling context surrounding it—a distinction that runs through the comparison made in this paper between the stand-alone and infused approaches.

Across both curricular traditions, however, the same practical tension recurs. Teachers who want to teach critical thinking must do so under pressure from school boards to cover a fixed syllabus within a set time frame. Even where critical thinking is welcomed in principle, applying it, assessing it, and sustaining it across a school year remain genuinely and practically difficult, and not every teacher who wants to foster higher-order thinking is able to do so within these constraints (Rabaah et al., 2016). This tension—between the growing institutional demand for critical thinking and the practical limits teachers face in delivering it—is the starting point for the present study.

Creative teaching supports both a child's critical thinking and their academic performance, and it helps build the confidence students need to engage with difficult material rather than avoid it. Yet many students continue to struggle to move beyond surface engagement with classroom content, which in turn limits their ability to apply reasoning skills to genuine problem-solving. This is a gap that follows them beyond school into professional settings where creative and critical thinking are expected (Heong et al., 2020; Alotaibi, 2019). Teachers, meanwhile, are the ones expected to close this gap: through questioning strategies that sustain classroom discussion (Vieira & Ponte, 2024) and that prompt students to think independently, formulate their own responses, and engage in reasoned debate with peers (Zwiers & Crawford, 2023). Communication itself plays a supporting role in this process—Dung (2024) and Vansdadiya et al. (2023) both find that structured communicative activities strengthen not only academic performance but also students' relationships with peers and teachers. What remains less well understood is how two teachers working under different curricular structures—one teaching critical thinking directly, the other embedding it within mathematics—actually go about this work day to day, and what helps or hinders them. That is the research gap this study addresses.

OBJECTIVES OF THE STUDY

The purpose of this study is to investigate whether, and how, two teachers in the Kuala Lumpur area—one teaching Hikmah Pedagogy at a Malaysian international school and the other teaching mathematics at a Saudi-curriculum school—are fostering critical thinking through creative teaching, and whether their students benefit from it. The study pursues three objectives. They are:

1. To explore how the stand-alone and infused teaching methods enhance students' critical thinking skills
2. To identify the constraints that impede the development of students' thinking skills
3. To determine the advantages and disadvantages of the stand-alone and infused methods.

RESEARCH QUESTIONS

The objectives translate into the following research questions:

1. How do the critical thinking teaching methods examined in this study support the development of students' critical thinking?
2. What challenges do teachers face in applying these teaching methods?
3. What are the advantages and disadvantages of using each teaching method?

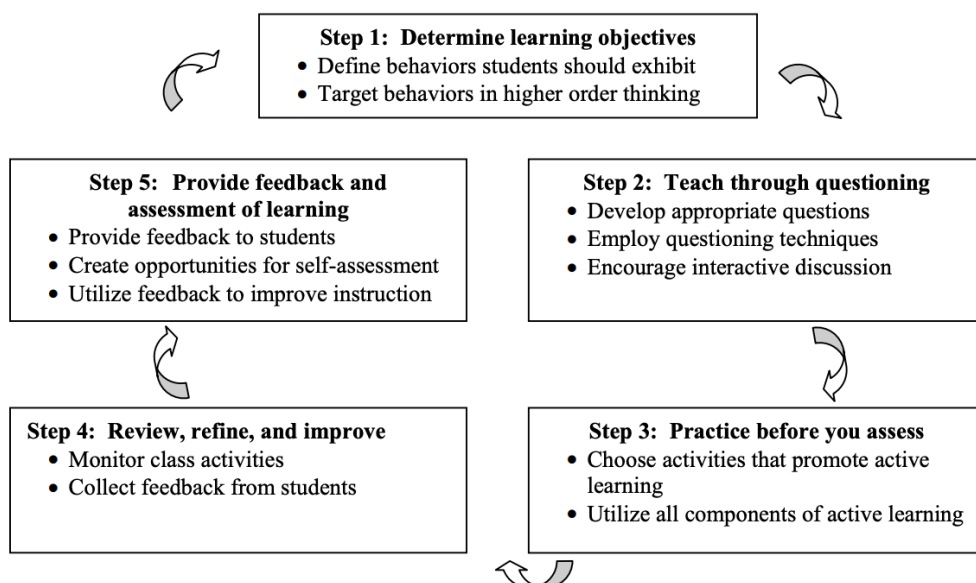
LITERATURE REVIEW

Theoretical Underpinnings

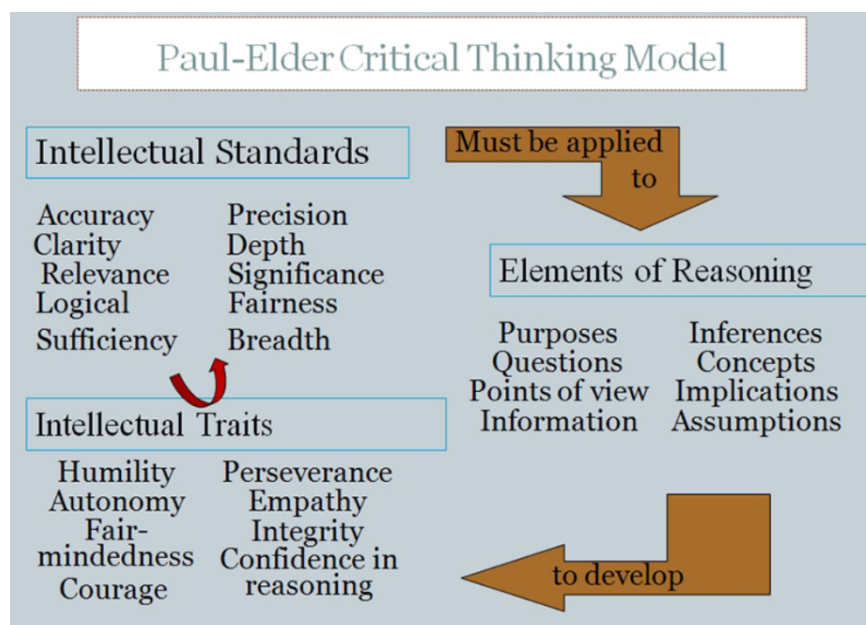
This study draws on two established frameworks to structure both data collection and analysis. The first is Duron et al.'s (2006) five-step model, described by the authors as a framework "that can be implemented in virtually any teaching or training setting to effectively move learners toward critical thinking" (p. 1). Its five steps—determining learning objectives, teaching through questioning, practising before assessing, reviewing and giving feedback, and using appropriate assessment techniques—were used as an observation checklist to determine whether, and how, each teacher's lesson design moved students toward critical thinking (Figure 1).

Figure 1

Duron et al.'s (2006) Five-Step Model for Moving Learners Toward Critical Thinking



The second framework is Paul and Elder's (2002) model of critical thinking, which identifies three components: the intellectual standards that should be applied to reasoning (e.g., clarity, accuracy, precision, relevance, logic, fairness), the elements of reasoning itself (e.g., purpose, question, inference, assumptions, point of view), and the intellectual traits that emerge from consistently applying those standards (e.g., intellectual humility, courage, autonomy, and fair-mindedness). While Duron et al.'s model describes what a teacher does, Paul and Elder's model describes what a student's thinking looks like once critical thinking has taken hold—together, the two frameworks enable this study to examine both instruction and outcome side by side (Figure 2).

Figure 2*Paul and Elder's (2002) Model of Critical Thinking*

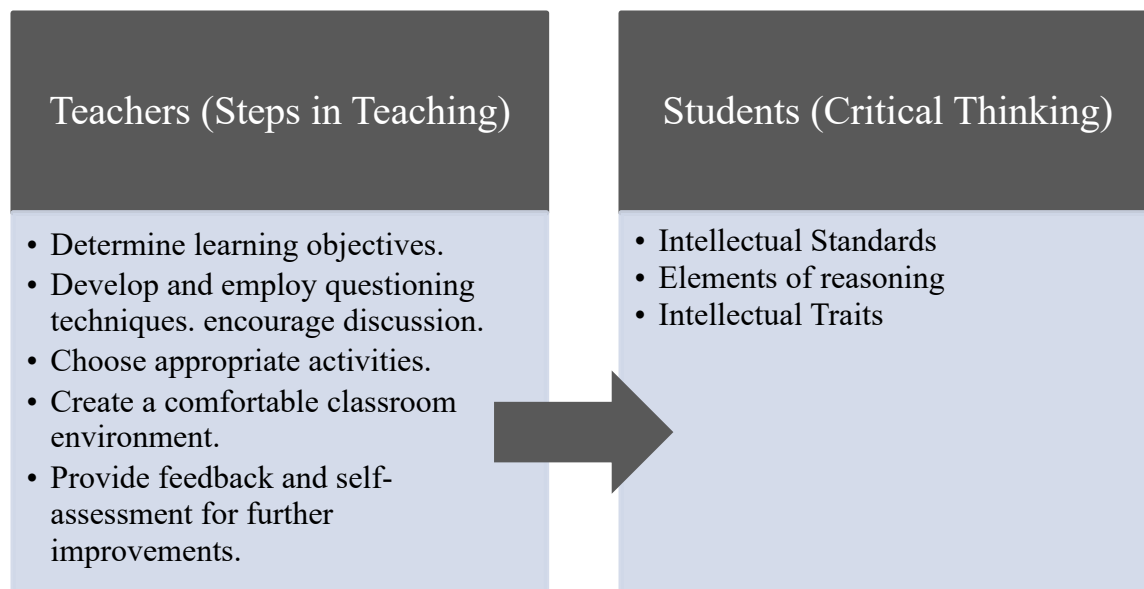
Conceptual Framework

For this study, the two frameworks were integrated into a single conceptual model (Figure 3), used during observation as a checklist to determine, first, whether a teacher's lesson design reflected Duron et al.'s five steps and second, whether students' responses reflected Paul and Elder's intellectual standards, elements of reasoning, and intellectual traits. Where several students displayed multiple elements of Paul and Elder's model during a lesson that also satisfied Duron et al.'s five steps, the teacher was judged to have effectively instilled critical thinking awareness.

Underpinning both frameworks is Social Constructivist Theory (SCT) which, unlike Piagetian constructivism, treats learning as inherently social. Learners are not passive recipients of knowledge but active participants in a community that jointly constructs and shares it. Personal, instructional, and environmental factors all shape this process, and SCT's emphasis on structured, observable interaction is part of why it pairs naturally with the two frameworks above, both of which likewise treat critical thinking as something built through classroom dialogue rather than transmitted through content alone.

Figure 3

The Conceptual Model for Evaluating Teaching and Learning Outcomes in the Study



Stand-Alone and Infused Approaches

Teaching methods for critical thinking are commonly divided into two broad families. The stand-alone approach—sometimes called "teaching for thinking"—treats critical thinking as its own subject, with dedicated lesson plans, materials, and a curriculum team built specifically around it; the United Kingdom, the United States, and Australia all offer college courses built entirely on this model. The infused approach, by contrast, embeds critical thinking within an existing subject, using whatever techniques best suit that subject's content (Bag & Gursoy, 2021; Jocius et al., 2023; Lithoxoidou & Georgiadou, 2023). Both approaches have empirical support. For instance, a comparative study by Solodikhina and Solodikhina (2023) found meaningful improvement in students under either method. Other empirical works (e.g., Wale & Bishaw, 2020; Aygün & Yavuz, 2020; Bellaera et al., 2021) each report positive effects from applying one or both approaches. The main trade-off reported in the literature is that stand-alone programmes, while thorough, can struggle with real-world transfer, whereas infused approaches tend to produce deeper application of critical thinking within the subject they are embedded in, at the cost of a less systematic, dedicated focus on thinking skills themselves (Angelianawati et al., 2024). This is likely caused by what is called a transfer-of-learning problem. In simple terms, skills practiced on generic material in a stand-alone course must still be transferred to new domains when needed, whereas infused approaches build critical thinking directly within the domain of application, which eliminates the transfer step and yields knowledge that is more readily activated in context (Perkins & Salomon, 1992).

This study examines one instance of each: Hikmah Pedagogy as the stand-alone approach, and an infused mathematics classroom using the Six Thinking Hats technique as the infused approach.

Hikmah Pedagogy (Stand-Alone Approach)

Hikmah Pedagogy is a stand-alone method rooted in Philosophy for Children (P4C), a movement that emerged in the 1970s and 1980s around the concept of a "community of inquiry" (Lipman et al., 2010). Influenced by Lipman's work, educators using this approach place students at the centre of philosophical dialogue, using stimulus materials such as novels and teachers' manuals to prompt sustained questioning and reasoning. Naiditch and dos Santos (2020) describe this as transforming students from passive listeners into active co-investigators alongside the teacher. Because a full lesson cycle in this approach can span a semester or an entire academic year, it shares P4C's long-horizon structure rather than being confined to a single unit of content.

It is worth distinguishing this study's own aim from that of prior Hikmah Pedagogy research. For instance, Hussien et al. (2021), for example, studied how Hikmah Pedagogy develops primary school students' speaking skills and their attitudes toward the English language specifically. The present study instead examines Hikmah Pedagogy purely as a vehicle for critical thinking development, independent of any particular subject-language outcome, which is why it is treated here as the stand-alone comparison case against the infused mathematics classroom described below.

The Infused Approach: Six Thinking Hats in a Saudi-Curriculum Mathematics Classroom

The second classroom in this study follows a Saudi national curriculum and infuses critical thinking into its mathematics lessons using the Six Thinking Hats technique, which guides students through a fixed sequence of thinking modes—represented by six colours—rather than asking them to address a problem all at once (Table 1).

Table 1
Summary of the Six Thinking Hats Technique Used in the Infused Mathematics Classroom

Hat colour	Thinking type
White	■ Facts, figures, data
Blue	■ Agenda, decisions, global overview
Yellow	■ Positive outlook, benefits
Black	■ Critical analysis, weaknesses
Green	■ Creative thinking, growth, new ideas
Red	■ Emotions, hunches, instincts, feelings

This technique reflects a broader emphasis, within Saudi Arabia's 2018 curriculum reform, on skills such as observation, analysis, synthesis, evaluation, evidence collection, and construction—all framed by the Saudi Ministry of Education as components of critical thinking (Alharbi, 2022). Rabaah et al. (2016) traces the Saudi curriculum's development through three stages, moving from traditional rote learning, through a transitional stage, to a third stage centred on learner-centred, inquiry-based, problem-solving instruction—a trajectory that closely parallels the shift many Malaysian classrooms are also attempting, even though the two national systems arrived at it through different policy routes.

A useful international comparison for the infused approach comes from Japanese mathematics education, which is grounded in the belief that genuine problem-solving, rather than procedural demonstration, is what enables real understanding (Baldry et al., 2023; Foster, 2019). Japanese teachers typically take a deliberately passive role, allowing students to develop their own solution methods for carefully designed, conceptually challenging problems, while still structuring lessons so that students encounter procedures recently introduced in class. Yu and Zin (2023) similarly find that problem-based learning of this kind is effective at enhancing critical thinking, evidence that supports the underlying logic of the infused, subject-embedded approach examined in this study's mathematics classroom.

METHODOLOGY

Research Design

This study is situated within the interpretive paradigm, which holds that reality is socially constructed and best understood through the meanings and perspectives of those enacting it in context (Guba & Lincoln, 1994). Accordingly, the study adopts a qualitative multiple-case study approach to examine how two teaching strategies—stand-alone and infused—are implemented in practice. The stand-alone case is an international school in Gombak using Hikmah Pedagogy, while the infused case is a school in Ampang, in the Kuala Lumpur area, that follows a Saudi national curriculum and teaches mathematics. Rather than testing predetermined hypotheses about which strategy produces superior outcomes, the study seeks to understand how each strategy is enacted within its particular institutional and curricular context, consistent with the interpretive concern for contextualized meaning over generalizable causal claims. Data collection and analysis were designed around the study's three research questions.

Participants and Demography

A total of six participants took part in this study: two teachers and four students, drawn from two schools. Participants were selected through purposive sampling, with teachers required to have direct familiarity with the teaching strategy under investigation at their respective site—Hikmah Pedagogy at the international school, or the infused Six Thinking Hats approach at the Ampang school. At each site, one teacher was observed and interviewed. The international school (IS) in Gombak had an observed classroom of approximately 12 students, while the Ampang school's classroom had approximately 20. From each classroom, two students were selected for interviews based on their teacher's recommendation. All four student participants were female. At the international school, this arose incidentally from the recommendation process; at the Ampang school, it reflects a structural feature of the research site itself—the class was gender-segregated, and researcher access was granted only to a female classroom. This distinction is noted to clarify that participant gender was not a deliberate sampling criterion but, in the Ampang case, a condition of site access. Demographic details for the teacher and student participants are presented in Table 2 and Table 3, respectively.

Table 2*Demographic Information of the Participating Teachers (N = 2)*

School	Subject Taught	Gender	Teaching Experience	Qualification
International School (Gombak)	Hikmah Pedagogy	Female	Six years	Master's
Ampang School (Saudi curriculum)	Mathematics	Female	Four years	Master's

Table 3*Demographic Information of the Participating Students (N = 4)*

School	Gender	Grade	Number of Students Interviewed
International School (Gombak)	Female	Four	Two (S1, S2)
Ampang School (Saudi curriculum)	Female	Four	Two (S3, S4)

Instruments

Interview protocols consisted of approximately nine questions, organised into three sections that mapped directly onto the study's three research questions: teachers' perceptions of critical thinking (RQ1), how students develop critical thinking through creative teaching (RQ2), and the challenges encountered in applying these methods (RQ3). Classroom observation focused on how students responded to their classmates and to questions posed by peers or the teacher, and was video-recorded in full. Two observation checklists were used, corresponding to the two frameworks described above.

The first checklist, built from Duron et al.'s (2006) five-step model, recorded whether the teacher's lesson:

1. Determined clear learning objectives for critical thinking ("what they need to know")
2. Encouraged participation through developing relevant, thought-provoking questions and effective questioning techniques
3. Ensured practice aligned with assessment through appropriate learning activities, and continuous review, monitoring, and adjustment
4. Cultivated a comfortable and supportive classroom environment
5. Provided constructive feedback, created opportunities for self-assessment, and used feedback to refine teaching
6. The second checklist, derived from Paul and Elder's (2002) model, recorded evidence of:
7. Intellectual standards: clarity, accuracy, precision, relevance, significance, breadth, depth, logic, fairness
8. Elements of reasoning: purpose, question, inference, concepts, points of view, implications, information, assumptions
9. Intellectual traits: humility, intellectual courage, empathy, autonomy, integrity, perseverance, confidence in reason, fair-mindedness

The protocols and observation checklists were validated by research experts in mathematics teaching, Hikmah Pedagogy, and Duron et al.'s (2006) five-step model.

DATA COLLECTION

Data were collected using multiple qualitative instruments to allow triangulation across teacher perceptions, student experiences, and observed classroom practice. Three primary methods were employed: interviews, classroom observations, and structured checklists. Semi-structured interviews were conducted using a protocol of approximately nine questions, developed directly from the study's three research questions and organized into three corresponding sections: teachers' perceptions of critical thinking, the ways students develop critical thinking through creative teaching methods, and the challenges encountered in implementing each approach. Both teacher and student interviews were conducted, with student interviews supplementing and contextualizing the teachers' accounts across all three research questions.

Classroom observations were conducted at both sites and video recorded in full. Observations focused on student behavior—specifically, how students responded to their classmates' contributions and to questions posed by either peers or the teacher during lessons. Two structured checklists were used to support and standardize the observational data. The first, based on a five-step instructional model (determining learning objectives, encouraging participation through questioning, aligning practice with assessment, reviewing and refining instruction, and providing feedback), was used to document each teacher's pedagogical approach. The second, derived from Paul-Elder's Critical Thinking Model, was used to assess students' critical thinking development as observed in the classroom, covering intellectual standards, elements of reasoning, and intellectual traits.

DATA ANALYSIS

The study revealed, through feedback from both students and teachers, that the method provided benefits beyond the classroom and academic performance, extending as far as the students' social lives. However, it was also found that the method could be challenging to apply at times, with results not always immediately visible in students. Despite this, teachers continued to make an effort to be even more creative in planning their upcoming lessons, suggesting that there is still potential to assess the lasting impact of the applied lessons on students. Teachers noted that students showed improvements in their perspectives, presenting more reasoned and logical arguments that could lead to meaningful discussions and debates.

Both teachers, despite using different methods, were found to align with all five steps of Duron et al.'s (2006) framework. Beyond this shared baseline, three factors emerged as central to how effectively critical thinking was fostered in each classroom, each corresponding to one of the study's three research questions. These findings, along with two additional key ideas identified as useful for developing a systematic strategy to enhance students' critical thinking, are summarized in Table 4.

Table 4
Research Questions Mapped to Key Findings

Research Question	Key Findings
1) How do the critical thinking teaching methods examined in this study support students' critical thinking?	Benefits of critical thinking for students; critical thinking versus direct instruction; observed effects of each method; teachers' reasons for their chosen method
2) What challenges do teachers face in applying these teaching methods?	Time and resource challenges; difficulty of evaluation; students' attitudes; students' motivation
3) What are the advantages and disadvantages of each teaching method?	Effectiveness of each creative teaching method; teachers' experiences; students' social development

Finding 1: The Art of Questioning

The first finding is the art of questioning. Both teachers emphasized the importance of students asking questions that would encourage them to reflect on their answers or enable them to respond with thoughtful and meaningful insights. Questioning is a vital teaching method practiced by students and teachers and affects student awareness (Shanmugavelu et al., 2020; Salmon & Barrera, 2021; Xu et al., 2024). Higher-level questioning was found more consistently or regularly in the Hikmah Pedagogy classroom than in the mathematics classroom, which the researchers attribute to the clearer, more deliberate questioning procedure built into the stand-alone method. Teachers worldwide have the flexibility to select any teaching method they believe is suitable for achieving the lesson's objectives, provided there are sound reasons for their choices. The teachers were asked to justify their decision to teach certain skills through either stand-alone or integrated methods. Both teachers, when asked to justify their choice of stand-alone versus infused teaching, described it as largely a matter of personal preference shaped by the results they had seen. Each reported that the positive outcomes of their approach informed their decision to continue incorporating critical thinking into the curriculum long term.

Finding 2: Consistency

The second key finding highlights the importance of maintaining consistency in teaching critical thinking skills rather than limiting it to a single semester, unit, or grade. Critical thinking instruction should be an ongoing process to ensure students retain the skill—much as a child who learns a language at a young age may lose it if they stop practicing as they grow older.

Culture plays a significant role in both schools, shaping attitudes in ways that contributed to conflicts and differences many teachers tried to address. From a young age, children in both contexts are taught not to question or challenge their elders, and this cultural norm strongly influences their attitudes and behaviour in the classroom. Consistent with this, the researchers observed that students in both classrooms appeared shy and hesitant when asked to answer questions or express their feelings and opinions. This underscores why consistency matters: without repeated practice, gains in critical thinking risk fading, much like an unpractised skill or a language learned in childhood.

Finding 3: Advantages, Disadvantages, and Choosing Suitable Stimulus Material

Critical thinking instruction in both classrooms produced benefits beyond academic performance, extending into students' social lives: teachers reported that students developed stronger skills in respectful disagreement and in appreciating others' opinions, even when they disagreed with them. Teachers also noted improvements in the quality of students' reasoning—more logical, better-supported arguments capable of sustaining meaningful discussion and debate. The main disadvantage reported by both teachers was insufficient class time to fully develop and assess every student's critical thinking, which limited how far either method could be pushed within a normal school year. A third factor emerged specifically in relation to this trade-off: the choice of stimulus material or anchor problem used to prompt thinking—novels and open-ended discussion prompts in the Hikmah Pedagogy classroom, and structured word problems paired with the Six Thinking Hats sequence in the mathematics classroom—shaped how much of the available lesson time could realistically be devoted to sustained reasoning versus procedural coverage.

Taken together, these three findings—the art of questioning, consistency, and the choice of stimulus material—describe not just what each teacher did, but why one approach succeeded more in one dimension (questioning) while both converged on the same limiting factor (time) in another.

DISCUSSION**Consistency as a Missing Element in Existing Frameworks**

Duron et al.'s (2006) five-step model is thorough in explaining how a single lesson should be structured to foster critical thinking, but it does not address how that thinking is sustained across a school year or a student's broader education. Based on the observations in this study, the researchers propose that consistency should be treated as an additional, standing element alongside the five steps—not a sixth step within a lesson, but a condition that must hold across many lessons for the other five to have lasting effect. Critical thinking, unlike a fixed motor skill such as riding a bicycle, appears to deepen and change with maturity. To illustrate, an eight-year-old may judge lying as wrong simply because it causes harm, while an older student learns to distinguish a harmless white lie from a harmful one, refining that judgment through repeated exposure to differing perspectives.

Lipman (1995) observed a comparable pattern directly. Students who received sustained critical thinking instruction showed marked improvement, but reverted toward their previous level once that instruction stopped—much as a drawing skill degrades without continued practice. This suggests that critical thinking gains are not self-sustaining, and that a genuinely effective programme, whether stand-alone or infused, needs a multi-year commitment rather than a single unit or semester. The researchers recognise that this is easier to recommend than to implement: teachers in both classrooms observed here are visibly constrained by syllabus pressure and shifting school priorities, and sustaining a multi-year critical thinking programme will require support at the school level, not just individual teacher effort.

Mastering the Art of Questioning

The second finding concerns how questions are asked, not merely whether they are asked. Young children ask questions constantly and unprompted—from “why is the sky blue?” to far more searching

queries (e.g., “How do I know you see the same blue that I see?”)—and the task for a teacher is not to discourage this instinct but to sharpen it. Where students have been trained primarily to memorise rather than to engage, the researchers observed a tendency toward shallow or misdirected questions, producing correspondingly shallow answers. Marsh and Eliseev (2019) note that students naturally make mistakes when solving problems, and that this is not a failure to be corrected quickly but an opportunity: being asked why an answer was wrong, rather than simply told that it was, is what pushes students toward deeper engagement with the material. This is consistent with why the Hikmah Pedagogy classroom, with its more deliberate questioning procedure, showed the higher level of questioning observed in this study—and it suggests that questioning technique, more than subject matter, may be the more teachable and transferable skill between stand-alone and infused settings.

Choosing Suitable Stimulus Material or Anchor Problems

The third finding is that the material used to prompt thinking—a novel and an open discussion prompt in one classroom, a structured word problem paired with the Six Thinking Hats sequence in the other—shaped what kind of thinking students actually produced and how much class time it required. This mirrors the broader stand-alone/infused trade-off identified in the literature: stand-alone material, freed from covering a fixed syllabus, could support longer and more open-ended reasoning, while the infused material had to do double duty, teaching mathematics content and critical thinking simultaneously, which is very likely why time pressure emerged as the dominant constraint reported by both teachers. Despite this, both teachers remained enthusiastic about continuing to refine their lesson planning, suggesting that the constraint is one of time and institutional support rather than of teacher motivation.

CONCLUSION

Both the stand-alone and infused approaches examined in this study have genuine merit, and neither emerged as categorically superior to the other. The Hikmah Pedagogy classroom showed an advantage in the sophistication of questioning, while the infused mathematics classroom demonstrated that critical thinking can be taught without sacrificing coverage of core subject content. What distinguished more effective implementation in either setting was not the choice of method itself, but three practical factors: namely, the teacher's skill in questioning, the consistency of practice over time, and the suitability of the stimulus material used. Each of these factors offers a concrete, transferable lever for other teachers and curriculum designers considering either approach.

This study contributes to the wider literature on critical thinking instruction by comparing these two approaches directly within comparable Malaysian classrooms, rather than studying either in isolation. For practice, the findings suggest that professional development should prioritise questioning techniques specifically, that school leadership should plan for critical thinking instruction as a multi-year commitment rather than a single unit, and that time allocation — not teacher willingness — is the constraint most in need of institutional attention. For future research, comparing additional stand-alone and infused classrooms, ideally across a longer observation period, would help establish whether the three factors identified here hold more generally.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed. First, both curricula should be reformed to place greater emphasis on critical thinking skills within the subjects already being taught. Second, it is recommended that critical thinking be offered as a stand-alone course dedicated specifically to developing these skills in students, rather than relying solely on infusion into existing subjects. Implementing such an approach would likely benefit future generations by helping students cultivate stronger critical thinking abilities, which in turn may contribute to stronger social relationships.

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