

The Research Dialogue

An Online Quarterly Multi-Disciplinary
Peer-Reviewed / Refereed Research Journal

ISSN: 2583-438X

Volume-1, Issue-3, October 2022

www.theresearchdialogue.com



“Strategies to Develop Critical Thinking Skills in Students”

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Abstract:

Critical thinking shapes dispositions and processes for effective problem solving. Pedagogical strategies can stimulate critical thinking through classroom interactions, planned tasks, routine classroom culture, and selected media content (M. Burke, 1992). Learning objectives from the American Psychological Association stress the ability to design, conduct, and evaluate research through logical reasoning, supports searching for and assessing evidence, and calls for recognition of assumptions behind one's own and others' positions. An emphasis on logical reasoning among Premier group members places those objectives at the centre of a framework for critical thinking.

Keywords: *Critical thinking, Psychological Association, logical reasoning.*

1. Introduction

Critical thinking occupies a prime position among the educational objectives established at various levels of schooling, throughout the school and university curricula, and in almost all national qualification and professional standards. The aim of schooling and education is usually distilled into a few general outcomes. In most of these outcomes, the concept of critical thinking appears as a major element or as a logical subordinate of another overarching concept, for example, the concept of lifelong learning.

The value of critical thinking as a learning outcome has been supported by evidence suggesting stages and characteristics of change in acquiring the skill. Several models and metacognitive analyses outline a progress through phases or stages; educational attainment or qualification is defined accordingly at any chosen level. Recognising that critical thinking is not attained when a person has covered certain materials, concepts,

knowledge, skills or requirements and that it constitutes a set of cognitive processes and dispositions that can be progressively detected is valuable (M. Burke, 1992). A wide variety of approaches, including the work of de Bono, Philosophy for Children, socio-constructivism and dialogic teaching, may contribute to the development of critical thinking (A. Freeman, 1999).

2. Conceptual Foundations of Critical Thinking

Critical thinking refers to the ability to analyze arguments in order to determine their soundness, relevance, and justification, as well as the disposition to engage in this activity. Ennis, a prominent figure in critical thinking research, delineated over seventy critical thinking skills and dispositional indicators (A. Freeman, 1999). Burke presents a condensed list of critical and creative thinking skills and illustrates their application in grade-appropriate problem-solving scenarios (M. Burke, 1992). Both sets illuminate the nature of critical thinking without conforming to a formal definition. Unexamined assumptions can hinder critical thinking. For instance, an American researcher noted misconceptions surrounding entailment, judgment, and "arguing". The relationship between critical and creative thinking remains ambiguous, with some researchers asserting an outright distinction between the two and others proposing that each construct encompasses components of the other.

Burke's formulation implies a further distinction between first-order generating ideas and second-order clarifying ideas. Although originating outside the United Kingdom, Burke's formulations are widely favoured in that nation. His models conceptualize critical and creative thinking as interacting components within a coalesced framework.

2.1. Defining Critical Thinking

Stop and think: what is critical thinking? While many use the term in education, few define it clearly. Critical thinking's meaning remains elusive, despite its importance in various constructs like creative thinking, problem solving, and reasoning. Each of these represents different cognitive skills and processes, highlighting the complexity of managing information. Critical thinking is chosen here for its connection to various theoretical frameworks and teaching methods. Ennis (1985) describes it as "reasonable reflective thinking focused on deciding what to believe or do." This definition underscores that reasoning is just one part of critical thinking, encompassing belief and action. At its essence, critical thinking involves engaging with information and cognitive processes that define thinking. These processes could involve analysis, categorization, clarification, deduction, evaluation, hypothesizing, judgment, inquiry, interpretation, and more, emphasizing skills needed for effective reasoning and information handling. (A. Freeman, 1999)(M. Burke, 1992)

2.2. Theoretical frameworks and models

Critical thinking has been the subject and focus of many theoretical frameworks presented by authors across multiple disciplines. Some models are specifically aimed at critical thinking instruction or progression; these include Bloom's Taxonomy of Educational Objectives and the Structure of the Observed Learning Outcome (SOLO) Taxonomy. Critical thinking-related frameworks are also prominent in disciplines such as philosophy and critical thinking pedagogy, notably the Model of Critical Thinking of 1985 developed by the Foundation for Critical Thinking, the framework defined by McPeck (1990), and the Critical Thinking Disposition Model presented by Facione (1990). Such models can still be of interest because they partially delineate the construct or

highlight relevant aspects. Several theoretical frameworks have contributed to the understanding of critical thinking and continue to illustrate its pedagogical significance; others remain of historical interest but are less suited for contemporary critical thinking projects. Illustrative frameworks and models include those of Ennis (1989; 1996), Huitt (1998), McPeck (1990), Paul & Elder (2006), and Facione & Facione (1994). The frameworks of Ennis, Paul & Elder, and Facione & Facione are presented, compared, and critiqued with respect to their instructional alignment and assessment suitability. The frameworks of Huitt and McPeck are of historical interest. (Yazidah et al., 2017)

3. Classroom Strategies for Cultivating Critical Thinking

The cultivation of students' critical-thinking skills requires effective classroom strategies. Questioning plays a crucial role in promoting this competency. Open-ended questions encourage idea generation and support critical and creative thinking. Problem-formulating questions lead students to examine facts before concluding, while analytical questions deepen existing analyses. Reflective questions prompt consideration from various perspectives. Structured argumentation allows students to articulate claims, antitheses, and support arguments effectively. This method fosters connections across disciplines and deeper understanding. Dialogue provides a simple framework for students' exchanges, applying the above criteria to enhance discussions. Problem-based learning focuses on significant challenges relevant to students' interests, promoting critical-thinking development. Suitable problems should be perceived as intriguing and worthy of investigation. Socratic dialogues foster understanding by having students evaluate proposals in class, engaging in peer discussions where each student poses essential questions. Enhancing peer-to-peer exchanges and providing formative feedback encourages equitable participation. Reflective practices include journaling, self-assessment prompts, or metacognitive checklists. These practices can occur in class or as follow-ups, guiding students to assess their reasoning processes. (- &)

3.1. Questioning Techniques

Effective questioning techniques stimulate discussion, encourage elaboration on concepts, and prompt examination of alternative interpretations (Aimah & Purwanto, 2019). These techniques range from the simple, such as soliciting students to provide further explanations, to the sophisticated, such as requiring that they determine how best to frame a question (Nirwanto, 2017).

A widely used taxonomy identifies six cognitive levels: remembering, understanding, applying, analyzing, evaluating, and creating. Lower-order questions that require only remembering, understanding, and applying are unlikely to elicit critical thinking. Hence, the first step is to note whether the questions posed tend to invite lower-order, factual answers. Where this is the case, questions that dwell exclusively on name or description invite little analysis or interpretation, whereas those that probe function, structure, context, and inquiry promote deeper thought. That questions are predominantly lower-order is often indicative of students' internal simplification or "chunking": recaps framed only in terms of names tend to dominate. A second factor relates to the types of question that appear: where higher-order questions are missing, scaffolding may assist students in proceeding to the next level.

3.2. Structured Argumentation

Organizing arguments in structured ways significantly enhances reasoning effectiveness and clarity. Different structures serve various purposes and contexts, guiding students in articulating claims, supporting them, and anticipating rebuttals. Van Eemeren et al. (2015) characterize reasoned argument as a communicative act designed to induce acceptance of a contested claim. Eemeren and Grootendorst (2004) and Antonio Archila et al. (2022) analyze it as a multi-part move incorporating a claim, grounds, and warrant. Students often struggle to identify arguments in unstructured texts; thus, explicit instruction in structuring arguments fosters deeper understanding and improves analytic capabilities (Antonio Archila et al., 2022). Geheb (2018) adopts Toulmin's model and provides a scheme for structuring arguments in technical writing comprising claim, data, warrant, backing, qualifier, and rebuttal. Argumentation can also be a method for problem-solving in complex situations; Geheb proposes an artefactual view that regards arguments as products created to articulate and justify positions.

Organizing reasoning into established forms clarifies it for both students and their interlocutors. Clear reasoning facilitates its examination and enables the identification of assumptions and gaps. When students control, evaluate, and reformulate their own or others' reasoning, as well as articulate the reasoning behind a chosen solution, they gain insight and advance toward a more expert understanding of reasoning (Geheb, 2018). Schemes for organizing reasoning according to simple structures can also serve as heuristics for analyzing arguments constructed in longer or free-form formats, allowing learners to focus on the validity and soundness of the reasoning.

3.3. Problem-Based Learning

Problem-based learning (PBL) engages students in collaborative problem-solving with authentic, ill-structured problems that inspire and empower them. Objectives include enhancing content knowledge, developing higher-order cognitive skills, and promoting lifelong learning. Instructors set learning objectives and choose appropriate complex problems that are motivating and relevant. These problems must have multiple solutions, be solvable through inquiry, and extend beyond simply finding an answer. A refined PBL approach emphasizes critical-thinking skills while recognizing that the nature of the problem defines the potential for transfer beyond specific disciplines. It encourages selecting problems that promote discipline-specific transfer effectively. PBL provides chances to enhance critical-thinking skills through independent and group interactions. Instructors focus on instructional design, including equitable participation and feedback principles, while maintaining the authenticity of the context. Students should collaborate in small groups to define the problem, formulate research questions, and develop action plans. They engage in structured inquiries, sharing and refining their understanding of the material, which can result in broader, conceptually integrated insights. (Ali et al., 2019)

3.4. Socratic Dialogues and Dialogic Teaching

Socratic dialogues, based on Socratic questioning and dialogic teaching, engage specially prepared students in collective investigations through guided exchanges. These dialogues encourage participants to explore alternatives, enhancing understanding and higher-level thinking. By collaborating on complex issues in education, students examine morally charged topics and contextual situations for self-exploration. Outcomes support peer

dialogue, exposing students to various lived experiences and social perceptions. In-person discussions about readings improve material comprehension and promote personal reflection on topics. After group work, participants create shared representations, fostering collaborative ideation and refinement. Dialogic teaching utilizes dialogue theory to inspire further discussion. Teachers craft specific questions and guide students to integrate multiple readings, helping them connect content to personal experiences. Multi-week events allow for revisiting peer insights, guiding shifts from diverse viewpoints to unified positions, enhancing mutual understanding through inquiry. (Schneider Muessig, 2004)(Margaret Vincent Hogshead, 2017)

3.5. Reflective Practice and Metacognition

Metacognition refers to the process of thinking about one's own thinking and is essential for self-regulated learning (Lee, 2009). Hence, the development of metacognitive skills helps facilitate and enhance critical thinking. Teachers can implement structured reflection activities to promote students' self-reflection and metacognition. The presence of clear reflection prompts also encourages students to engage in higher-order thinking and discuss key issues during collaborative writing. Furthermore, providing students with templates and lists of useful questions focused on specific aspects of their learning fosters their meta-awareness and enables them to identify deficiencies in their final products. Such structured and targeted help facilitates the ample construction of reflective writing without overwhelming students. Journaling, self-assessment questions, and metacognitive checklists are exemplary tools teachers can use to foster reflection and meta-awareness among students.

3.6. Collaborative Inquiry and Peer Review

Collaborative inquiry and peer review allow students to co-construct knowledge and develop critical thinking while engaging with others' work. It enables students to explore complex problems and integrates metacognitive awareness into the curriculum, considering various perspectives. Peer review deepens content engagement, enhances responses to others' ideas, and sharpens one's reasoning skills, benefiting both sharing and receiving knowledge. Evidence-based peer feedback focuses on critical-thinking processes and illustrates thoughtful dissemination, crucial in today's knowledge society. Responding thoughtfully to contradicting evidence helps students adapt their thinking over time. A collaborative peer-review cycle framework, developed from course trials, assigns roles for inquiry stages, establishes norms, and specifies shared information. This model includes quality criteria for feedback and tools to enhance accessibility to feedback. Implementing the peer-review cycle at various stages fosters continuous improvement, ensuring that critical-thinking skills learned during dissemination remain active in students' minds and develop over the long term. (Mora et al., 2020)(Petrosino, 2017)

4. Assessment of Critical Thinking

In educational contexts, assessment serves multiple purposes: enhancing teaching, providing feedback, certifying achievement, and fostering accountability. Some assessments fulfill various roles, while others are more specific. Courses generally incorporate formative assessments to inform instruction and guide learning, alongside summative assessments for evaluating progress. Critical thinking must be explicitly assessed in curriculum

design. Formative assessment provides essential data on student thinking and helps teachers tailor their instruction to meet individual needs. Various ongoing data types offer insights into students who may be struggling. Such data can stem from classroom observations, “think-aloud” protocols, exit tickets, and more. Teachers can monitor the thoughtfulness of student responses during discussions and written work, tracking arguments and counterarguments presented. By paying attention to prompts from students, educators gain insights into learners' reasoning and perspectives. Summative assessments evaluate the extent of students' acquisition of critical thinking skills relative to curricular targets. All critical thinking performance should align with students' progression, showcasing their overall development through final demonstrations of acquired thinking skills. (Gosnell, 2010)(- &)

4.1. Formative Assessments

The aim of cultivating critical thinking entails the enhancement of analytical and evaluative competencies that facilitate informed decision-making, with the potential to transcend individual courses, programs, and institution-wide initiatives. It is frequently built into learning outcomes at these three levels. Research underscores the slow progression of these abilities among students and their enduring impact on later career advancement. Consequently, efforts to advance critical thinking are generally framed as a critical-thinking initiative, emphasising a specific cognitive practice. Numerous examples reveal the academically beneficial character of critical-thinking interventions and provide justification for focusing pedagogical efforts on this skill (J. Sinwell, 2017).

Formative assessment consists of methods that elicit evidence of learning from students and feedback techniques that support improvement based on the gathered evidence. Formative assessment practice has the potential to accelerate the development of critical-thinking skills by communicating relevant benchmarks and enhancing self-regulation. Student performance can be monitored throughout a course and feedback provided via ongoing assessment tasks or reflective prompts, thereby producing data that inform instruction. Furthermore, the incorporation of unobtrusive feedback tasks into traditional critical-thinking interventions fosters sustained practice.

4.2. Summative Assessments

Summative assessments are usually devised to gauge students' comprehension of previously provided knowledge. They occur during the last stage of the learning cycle and help evaluate what students have actually learned during the entire process. Within the context of critical thinking, summative assessments can serve dual purposes. They can be used to determine whether students are capable of replicating previously acquired knowledge (lower-order thinking) and whether they can make use of what they have learned (higher-order thinking) (Nirwanto, 2017). In such scenarios, instructor feedback is typically absent, making it imperative for the teaching staff to provide students with a summary of the learning process so that they can obtain the necessary information to partake in final assessments that promote critical thinking without needless information overload (J Peeters et al., 2016). Demonstrating whether students are capable of applying what they have learned is far more important than simply establishing whether they still know it.

The integration and applicability of critical-thinking assessments ought to be an explicit component of the course outline in order to ensure that students understand that they are being formally evaluated on an ongoing basis and not solely during specific intervals.

4.3. Rubrics and Performance Tasks

Carefully prepared rubrics greatly enhance the reliability and consistency of the assessment of performance tasks. A rubric consists of criteria that describe the aspects of performance to be considered and performance anchors that describe different degrees of quality or sophistication. Criteria for critical thinking could include the soundness of arguments, the relevance of evidence, and the justification of conclusions aligned with a learning progression. Performance anchors can be developed from a collaborative review of student work at several levels of quality according to the selected criteria (M. Moskal, 2019).

Critical thinking can be assessed with various performance tasks, such as analyzing a case study, writing a position paper, participating in a debate, or proposing a solution to a problem. The specific task should be aligned with a corresponding critical-thinking learning progression that specifies the characteristics of exemplary work at each instructional level. The selection of a task that requires students to demonstrate their critical-thinking skills in conjunction with the content of the unit and the curricular expectations enhances the validity of the assessment (Cascini & Rich, 2007).

5. Curriculum Design and Integration

Curriculum design is a crucial aspect of educators' systematic attempts to cultivate critical thinking in students. Therefore, the definition of the program desired of students and the tools needed to monitor their progress along that route must be communicated to curriculum designers. Curriculum goals, content, and assessment formats must correlate with desired outcomes to facilitate instructional choices that promote critical-thinking development (Duesbery & Justice, 2015). A focused, coordinated effort within an individual discipline is often feasible and is likely to produce deeper insight and understanding than an approach that spans multiple subjects. Nevertheless, opportunities do exist for linking critical-thinking objectives across the curriculum, particularly when general schooling objectives shift to higher levels of complexity and students undertake more integrated work (L. Mortensen & D. Moreland, 1985).

Critical thinking is not simply academic, nor is it the exclusive preserve of a select few disciplines; consequently, it must be addressed by different curricula and different institutions for students at all stages.

6. Challenges and Mitigation Strategies

Utilizing critical thinking poses challenges for educators due to common misconceptions regarding the term and its application in classrooms. Teachers may erroneously perceive their students as critical thinkers simply because they engage in discussion, express opinions, or employ questioning in various forms. This misinterpretation does not account for the complexity of critical thinking nor the necessity to develop the requisite thinking and reasoning skills. Distribution of resources offering guidance on strategies and techniques for fostering critical-thinking skills in diverse classroom settings can mitigate such challenges (Carolina University CeTEAL, 2018).

7. Professional Development for Educators

The development of critical thinking skills is highly dependent on the help of an educator, whether that be a teacher or a university professor. If an educator does not understand or even recognize what critical thinking really is or how to support the learning of it, students will miss out on opportunities to master the skills needed for a lifetime of analytical and strategic thinking. Therefore, the implementation of an adequate professional development program is crucial in order to provide educators with updated strategies and knowledge to foster critical thinking in their students (Jones et al., 2011). Franco and Vieira (Franco & Vieira, 2019) proposed a professional development program based on ongoing teacher development principles to meet the needs of the context of higher education. This program consists of 5 two-hour sessions designed to help University professors understand critical thinking and effective teaching methods. Training for higher education educators on critical thinking models such as the Paul and Elder model enables them to create instructional products that promote critical thinking in their course design, enabling professors to create measurable objectives, learning activities, reflection and assessment opportunities, and evaluation tasks. Their professional development initiative, the Distance Learning Academy, aimed to help faculty incorporate components of the Paul and Elder model into their courses offered.

8. Policy and Institutional Support

The critical-thinking agenda relies on various policy levers and institutional supports, especially during leadership transitions. Initial efforts focus on scaling curricular and assessment initiatives, followed by capacity-building strategies that enhance institutional efficiency and optimize educators' deployment in smaller settings. This establishes a solid foundation early in student development. Staffing constraints are significant at this stage. Support through internships or fellowships helps disseminate discipline-specific practices to faculty in the local ecosystem, fostering recognition of critical-thinking efforts and indicating institutional commitment. Policy and evaluation measures are particularly critical; without institutional acknowledgment of degree-requirement alignment or systematic curricular improvement consideration, faculty engagement is weak. Statewide articulation agreements promote systemwide alignment and provide transition-to-practice opportunities for capstone developmental material. Gradual integration of degree perspectives and course mechanisms strengthens critical-thinking articulation. In this dialogue template for interdisciplinary induction, the integrated capstone mechanism appears the most viable. Completing existing institutionwide developmental initiatives provides external perspective through peer review while remaining aligned with relevant curricular enhancement modes. (M. Burke, 1992)(Jones et al., 2011)

9. Conclusion

Critical thinking is a 21st century skill that creates better citizens able to assess increasingly present “fake news” and ideas circulating in society. As teaching shifts from lecturing to student-centered pedagogy and project-based learning and critical thinking becomes a broader need across the educational system, educators must better connect pedagogical tools to the development of critical thinking skills. Such tools designed to promote critical thinking are already specified and attempt to measure its development. Critical thinking has executive functions involved in metacognition and is monitored through teachers’ and students’ dialogue and journaling. If significant

changes occur in critical thinking these tools do provide a better understanding of its development. Planning, organizing, and timing remain essential in such teaching, and there are many other factors that can both help and hinder the teaching of those skills; future research can both identify these clearly and provide additional support.

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An Online Quarterly Multi-Disciplinary
Peer-Reviewed / Refereed Research Journal

ISSN: 2583-438X

Volume-1, Issue-3, October 2022

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Certificate Number-Oct-2022/37



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Published in ‘The Research Dialogue’ Peer-Reviewed / Refereed Research Journal and
E-ISSN: 2583-438X, Volume-01, Issue-03, Month October, Year- 2022.

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