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Unveiling Critical Thinking Pedagogy: Classroom-Based Assessment Strategies in Higher Education

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Abstract
Promoting critical thinking (CT) skills has largely attracted the concern of numerous relevant stakeholders, including teachers, students, and policymakers, with the assumption that CT is a vitally learned skill needed by graduates. This study explores the extent of classroom-based assessment strategies used to promote the CT ability of undergraduate students in Vietnam. Qualitative research approaches were employed through in-depth interviews, classroom observations, and assignment analysis with a curriculum review of the Global Citizens Program at Swinburne Vietnam Alliance Program with FPT Education. The findings show that teachers have widely applied a couple of assessment techniques to increase the CT capability of students, including peer review, reflective writing, case study analysis and evaluation, teamwork projects, research-type assessments, and problem-solving. Furthermore, lecturers who are more aware of the importance of CT and those who are more flexible and skilled in testing self-developing techniques have more strategies for incorporating CT into their assessments. The study reveals that if CT is explicitly stated in the program learning outcomes and incorporated into the course outlines, it is more likely to be implemented.

INTRODUCTION

Critical thinking (CT) is defined as the intellectually disciplined process of actively and skillfully conceptualizing, analyzing, synthesizing, and/or evaluating information, according to Scriven and Paul (1987). However, it is important to note that there is still a lack of a universally recognized and comprehensive definition of CT, as noted by Sanders and Moulenbelt (2011) and Liu and Pásztor (2022). Glaser (1942) initially defined CT as the logical process of accurately evaluating statements, but it has evolved to encompass a broader scope of purposeful and logical reflection (Brookfield, 1987). Since the 1990s, CT has been recognized as a deliberate cognitive process involving interpretation, analysis, and self-regulation, essential

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for students' academic performance and curriculum integration, though lacking reliable assessment tools, its development can be fostered through diverse approaches (Facione, 1990). However, the absence of a valid and reliable tool to measure students' CT skills may hinder the evaluation of their academic progress in the curriculum (Mogea, 2022; You & Kim, 2014). This study aims to address this gap by developing a more effective assessment tool for CT, ensuring that the depth of students' CT abilities is accurately measured and fostered throughout their educational journey.

CT is a skill that can be developed and improved through various methods. These methods include engaging students in the cognitive learning process instead of relying on rote memorization, providing learners with learning strategies in addition to knowledge content, and using assessment strategies that focus on intellectual challenges rather than simply testing memorization (Snyder & Snyder, 2008).

Employers place significant emphasis on CT when considering potential employees, as they require individuals who can effectively process information by analyzing, synthesizing, and evaluating it. Additionally, employers value the ability to apply these skills in a practical manner (Indrašienė et al., 2020). In a study conducted on 189 European employers, Penkauskienė et al. (2019) found that employers preferred employees with CT as CT is a vital skill for employees' personal and professional success. Those with CT were found to make fewer mistakes in their jobs, self-regulate their tasks, and have higher social responsibility (Penkauskienė et al. 2019). This is because CT enables individuals to think more clearly and rationally and to thoroughly deal with workplace issues.

CT is also ranked #4 among the ten most essential skills needed in 2025 by the World Economic Forum (WEF), according to Whiting (2020). This underscored the necessity for effective CT assessment in higher education. The WEF emphasized several key aspects regarding the significance of CT. Firstly, CT was crucial for navigating complex and unpredictable environments to solve problems (Kim & Han, 2016). Secondly, the ability to critically evaluate new information and integrate it into existing frameworks was essential for fostering innovation and maintaining competitiveness (Thornhill-Miller et al., 2023). Kallet (2014) believed that employees with decision-making skills are preferred in the workplace as they can critically assess information, make informed decisions, and positively contribute to organizational goals. Given these factors, CT skill plays a critical role in both current and future job markets and emphasizes the necessity for effective CT assessment in higher education, as it ensures students are adequately prepared to meet the demands of the modern workforce and are able to make a meaningful contribution to their future lives and careers.

CT was essential for students to acquire subject knowledge and effectively evaluate their own practices (Brookfield, 1997). It has emerged as a crucial learning outcome for college students and a key educational objective for many educational systems (Halpern, 2001). While CT is becoming integrated into undergraduate curricula at universities, there is a lack of assessment of CT levels or evaluation of the effectiveness of CT programs. This research addresses these problems by exploring classroom-based assessment methodologies that can successfully measure and promote CT among university students. This study was conducted at the Center

for Global Citizenship Education (CGCE), Swinburne Vietnam, Ho Chi Minh Campus. This self-developed program by Swinburne Vietnam serves as a bridge to prepare Swinburne Vietnam students with vital skills and knowledge that help them study their major courses offered by Swinburne University of Technology, Australia. CT has been considered a key component in the CGCE Program in developing students' mindsets and enabling them to live and work globally.

The research results provide answers to three primary research questions:

(1) How do students perceive the assessment strategies for critical thinking implemented by their teachers in class?
(2) How do proficient teachers in critical thinking utilize assessment instruments?
(3) How can the importance of critical thinking in program learning outcomes be expressed and integrated into course syllabi?

THEORETICAL BACKGROUND

1. Concepts of assessment strategies to promote critical thinking skills

While there has been an increasing attempt to integrate CT into educational approaches, there is still ongoing debate regarding the methods used to assess CT (Shavelson et al., 2019). A couple of assessment methods widely used to evaluate CT were self-report writing, multiple-choice tests, or criterion-sampling evaluation (Shavelson et al., 2019). Numerous research studies have been undertaken to assess the influence of integrating CT into the curriculum; However, a consensus has not yet to be reached. Several researches have indicated that the integration was effective (Yang et al., 2008; Yuan et al., 2008). Some researchers have found no statistically significant results for CT treatments (Hesterberg, 2005; Şendağ & Odabaşı, 2009), while Cáceres et al. (2020) highlighted a mismatch between educational research and practices in exploring whether CT should be integrated into the curriculum or taught separately as a course. There exists a substantial corpus of study on the topics of nature, role, impact, and quality of classroom evaluations. Nevertheless, there is a deficiency in evaluating the extent to which a curriculum can provide critical skills or the degree of CT ability possessed by students. Additionally, concerns arise about overreliance on Bloom's taxonomy for testing and neglecting CT and other advanced cognitive abilities in assessment (Fleming & Chambers, 1983).

Despite the existence of a few standardized exams for assessing learners' CT abilities. These assessments typically regarded CT as a broad intellectual capacity that may be demonstrated in several fields (Norris & Ennis, 1989). However, some researchers argued that CT should be assessed in diverse situations (Cromwell, 1992). The unresolved issue pertained to whether CT should be evaluated in terms of its generalizability or specificity (Lai, 2011). Bibi et al. (2020) argued that high-order thinking skills such as CT are critically important for students and recommended that teachers ask thought-provoking questions. Some researchers viewed CT as closely linked to the specific circumstances in which it occurred. This means that an

individual may exhibit a high level of CT in one situation but not in others (Brookfield, 1997). On the other hand, other researchers viewed CT as the result of two factors: an individual's natural tendencies and cognitive abilities (Facione, 2011). According to Brookfield (1997), the development of CT was inherently influenced by social interactions. Within the framework of the classroom, peers or instructors served as crucial reflections. Communication allows individuals to gain a precise understanding of how their peers perceive them. Therefore, accurately evaluating CT necessitates the explicit recognition of its various aspects. If CT is considered to be contingent on contextual circumstances or individual characteristics, it should be integrated into the cultural environment. In this scenario, it is necessary to evaluate CT skills in a specific and structured manner, and standardized tests are not appropriate for this purpose. Assuming that CT is considered to be a communal undertaking. The review should encompass a wide range of experiences, contributions, and perceptions.

Brookfield (1997) raised a couple of assumptions for evaluating CT ability, of which CT was considered dependent on both the context and the individual. Assumption 1: CT assessment exhibits greater accuracy when conducted within specific circumstances. When assessing pupils' level of CT, both the actions they take and the words they use are significant dimensions. Assumption 2: The CT abilities of an individual learner can be assessed by their peers acting as a reflective tool. Peers do not necessarily refer to instructors, but might potentially include classmates. Assumption 3: The evaluation of CT should provide opportunities for learners to showcase, record, and rationalize their own conclusions.

2. Assessment methods for promoting critical thinking skills

Traditional assessment methods, such as self-report writing, multiple-choice tests, and criterion-sampling evaluation, were commonly used (Shavelson et al., 2019). These traditional methods were well-established and widely recognized for their ability to standardize testing and provide measurable data. They were efficient and cost-effective, making them practical for large-scale assessments. However, they were often criticized for their limitations in capturing complex cognitive processes and higher-order thinking skills.

Recent advancements in educational technology have introduced contemporary digital assessment tools that offer new ways to evaluate CT. Digital tools, such as online simulations, interactive case studies, and adaptive learning platforms have become more prevalent in assessing CT. These tools provide dynamic and immersive environments that challenge students to apply their CT skills in real-world scenarios. For instance, simulations have been shown to enhance student engagement and promote deeper learning compared to traditional assessments (Lamb et al., 2017). They offer the advantage of immediate feedback and the ability to customize learning experiences to individual student needs. However, these tools also present challenges, such as the need for significant resources to develop and maintain the simulations and the difficulty in ensuring all students have equal access to the necessary technology.

A critical examination of the efficacy of various assessment methods reveals mixed results. Traditional methods like multiple-choice tests were often criticized for their limited ability to

capture complex CT processes, focusing primarily on recall and basic comprehension (Butler, 2012). These methods could fail to measure students' ability to analyze, evaluate, and create, which were crucial components of CT. In contrast, performance-based assessments, such as essays and project-based learning, were praised for their ability to evaluate higher-order thinking skills. However, these methods could be time-consuming to administer and grade, and there might be subjectivity in evaluation (Gijbels et al., 2005).

Recent empirical studies have suggested that a combination of assessment methods might be the most effective approach. Integrating formative assessments, which provide ongoing feedback during the learning process, with summative assessments, which evaluate student learning at the end of an instructional period, can offer a more comprehensive view of CT development (Black & Wiliam, 2009). Formative assessments, such as peer reviews and self-assessments, were shown to enhance student engagement and foster a deeper understanding of CT concepts (Nicol & Macfarlane-Dick, 2006). This combination allows for continuous monitoring and support of student progress, helping to address individual learning needs and promote sustained cognitive growth.

Thus, integrating and assessing CT in educational approaches requires a multifaceted strategy that incorporates both traditional and contemporary digital assessment tools. A critical examination of these methods, when considering their efficacy and impact on learning outcomes and student engagement, is essential for developing a comprehensive understanding of how best to promote and evaluate CT skills in students. By leveraging the strengths of both traditional and digital assessment tools, educators can create a balanced and effective assessment framework that supports the development of CT skills across diverse learning contexts.

3. Classroom-based assessments to promote critical thinking

Classroom-based assessment, traditionally, was linked to the concepts of formative and summative evaluation and has been developed into two main directions, testing conceptual constructs and evaluating classroom practices (Lewkowicz & Leung, 2021). Classroom-based evaluation helped teachers understand what and how well students learned (Angelo & Cross, 1993; Yan et al., 2021). Learner-centered, teacher-directed, mutually beneficial, formative, context-specific, ongoing, and practical classroom assessment was needed (Angelo & Cross, 1993). According to Schildkamp et al. (2020) and Shepard (2000), classroom evaluation is crucial to measuring students' achievement and teaching activities and should be of the highest quality. However, concerns remain (Yan et al., 2021). This comprises instructors' observation and judgment quality management (Fauth et al., 2020; Stiggins & Bridgeford, 1985), self-developed test quality (Fleming & Chambers, 1983), and teacher assessment training quality (Coombe et al., 2020; Gullickson & Hopkins, 1987).

Brookhart (2010) suggested that classroom-based assessments should include clear evaluation criteria and opportunities for students to demonstrate their knowledge and skills. Other criteria were needed to assess high-level thinking ability. These include mind-processing concerns such as introductory language, pictures, scenarios, resource material, or puzzles; new materials to discourage remembering; and different difficulty levels. Leming (2016) suggested many

instructional methods and assessment strategies, including problem-based learning, case studies, experimental learning, simulations, game-based learning, team-based learning, research, and debating to encourage CT in students. Alsaleh (2020), in a review study, listed a couple of strategies that could be used in teaching and assessing critical thinking skills. The approaches for teaching include discussion, problem-based learning, collaboration, questioning, reading, writing, and peer review while techniques of assessment that could enhance CT are standardized tests, self-assessment, and some others designed by classroom teachers such as rubrics. Alsaleh (2020) also argued that there should be more innovations and approaches in teaching CT as the current teaching techniques mainly focus on course content.

Project-based learning, according to Saad and Zainudin (2022), was a method utilizing projects as the key activities in teaching. This method makes use of some tasks such as exploring, describing, investigating, and synthesizing to gain learning outcomes. Zulyusri (2023) recommended classroom teachers use the project-based learning approach to improve students' critical thinking skills. This is because the project-based teaching approach allows the students to execute their learning autonomy in selecting the topics, investigating the phenomena, generating the outcomes, and putting them into practice (Kokotsaki et al., 2016). Project-based learning had its strengths in improving learners' motivation, enhancing students' critical thinking and problem-solving skills, as well as completing work with high practicality (Retnowati et al., 2020). However, project-based learning needed to be well-designed with significant and real-life problems. Furthermore, students also needed time, skills, and motivation to identify the problems, research the issues, and generate solutions (Hung, 2011).

According to Brookfield (1997), the critical practice audit could help students think critically. Critical evidence analysis is fundamental to this strategy. It requires thinking about the past, understanding events, judging, deciding, and acting. Weekly practice audits are advised for learners. Critical practice audit helps learners understand their practices, examine past experiences, make judgments, and act. Classroom-based assessment procedures may enhance CT in students (Dondlinger & McLeod, 2015). Leming (2016) recommends real-world problems to help students understand the course materials, case study analysis to improve critical thinking, open-ended questions to encourage discussion and learning, and peer review to help students evaluate their peers' work. Carson (2015), and Gasper and Gardner (2013) believed that research-type examinations that require students to find, analyze, synthesize, and evaluate information can improve critical thinking. This fosters student critical thinking.

To assess learners' critical thinking levels, teachers can use some of the commercial CT standardized tests available or they can design their testing tools. Bers (2005) listed some of the most popular CT tests in higher education including (1) Collegiate Learning Assessment Project (CAL): Students are asked to write essays for open-ended tasks. This requires students to apply interpreting, analyzing, and synthesizing skills for their assignments; (2) Tasks in Critical Thinking: This performance-based assessment requires students to deal with dilemmas in humanities, social sciences, or sciences, and (3) Test of Reasoning: this type of CT assessment is designed to check the learners' reasoning skills. Alsaleh (2020) suggested that there may be no appropriate CT test for all contexts and teachers need to have a clear purpose for the tests. Wei et al., (2021) also highlighted the need to consider the fitness of course aims and goals when designing the assessment tools.

METHODS

The research applied qualitative methodologies to investigate the integration of CT in teacher assessment strategies. Particularly, it employed triangulation by combining insights from in-depth interviews (Mears, 2012), classroom observation (Ciesielska et al., 2018), and document analysis (Bowen, 2009). According to Stamenkov (2023), triangulation of data involved the use of multiple complementary sources to investigate a phenomenon. This approach could improve the reliability and validity of the findings. The chosen methods aimed to capture the richness and depth of participants' views and experiences through a process of psychology analysis (Pownall et al., 2023).

1. Data collection

The primary aim of these in-depth interviews was to gather comprehensive and nuanced data on students' perceptions of CT in relation to their teachers' assessment strategies. Specifically, these interviews aimed to elicit information on students' understanding of CT, their experiences with various assessment methods, and their views on how these methods influenced their learning and engagement. Follow-up questions were posed to encourage the research participants to elaborate on issues they wished to discuss, helping the researchers gain more comprehensive insights into the research focus. In-depth interviews are particularly suited for this purpose as they allow researchers to delve deeply into participants' viewpoints, experiences, and insights, thereby uncovering rich, detailed information that aligns with the research objectives (Creswell, 2013).

To ensure the consistency and depth of the data collected, an interview protocol was developed. This protocol included a set of open-ended questions designed to explore various aspects of CT assessment, such as students' understanding of CT, their experiences with different assessment methods, and their perceptions of how these methods impacted their learning and engagement (Patton, 2015). Additionally, document analysis was employed to complement the interview data. Researchers analyzed students' assignments and the curriculum of the Global Citizen Program to identify how CT is explicitly stated in the program's learning outcomes. This method aimed to verify the presence and emphasis of CT within the educational materials and to ensure alignment with the program's goals by examining how CT is incorporated into assignments and described in curriculum documents.

Observations of video documentation of the educational process were also conducted (Heath et al., 2010). Researchers were granted access to video recordings from the academic department, covering both teaching and learning activities. Four classes were chosen for observation because they are at the highest level of the program, where the school designed the courses specifically to teach students CT. These classes were observed, with six hours of teaching per week, over the course of one month. A structured observation protocol was used to systematically witness and record different aspects of teaching methods. This protocol included specific criteria related to CT pedagogy, such as the types of questions teachers asked, the opportunities for student reflection, and the integration of CT tasks in classroom activities. This method provided valuable insights into the actual teaching practices and how they align

with the assessment of CT, thereby addressing the research objective of understanding teachers' pedagogical approaches to CT assessment.

The informants selected for the study were students who were taking the Global Citizen Program (Center for Global Citizenship Education). These students were in their first year of education at Swinburn Vietnam, Ho Chi Minh Campus, taking the Global Citizen Program as the foundation to prepare for major courses offered by the Swinburne University of Technology, Australia. An invitation letter comprising the research aims, as well as the consent form was sent to four classes of level 6 (the highest level) during the data collection time. A total of 20 students, consisting of 12 females and 8 males aged 18 to 20, agreed to participate in the study. All students at this level had met the language proficiency requirements, allowing the study program to focus primarily on skills and knowledge that would support their global studies, living, and professional endeavors, among which critical thinking was one of the key skills directly taught or integrated into their learning lessons.

2. Data analysis

Thematic analysis was used in the study to identify recurrent themes and patterns in the gathered data. Data were organized and categorized using content analysis, following the paradigm of Clarke and Braun (2017). Using the Nvivo program (Limna, 2023), data segments were coded in order to classify them for use in assessment strategies. The themes and patterns generated in this study come from the review of the literature, careful interpretations of the interviews and observations, and curriculum analysis. The framework was used to categorize and examine textual and visual content from documents and video documentation from a contextual perspective, as mentioned by Rogers (2023). Because the data analysis process was iterative, themes could be adjusted and refined as new information came to light. To maintain coherence and consistency throughout the investigation, the researchers also often contrasted and compared their findings. Subsequently, the discerned themes and patterns were construed inside the framework of the study inquiries, furnishing a more profound comprehension of students' attitudes towards CT and its incorporation into evaluation tactics. The last phase was combining the results from many data sources to create a thorough story that tackled the study's purposes.

3. Ethical considerations

Ethical considerations demonstrate the dedication to research integrity, participant respect, and ethical norms. These measures boost research credibility and reliability (Nneoma et al., 2023). Before in-depth interviews and classroom observations, participants were informed of the research purpose, procedures, and rights. All individuals gave informed consent, confirming their voluntary involvement. Participant confidentiality was protected. Participants' identities were anonymized to safeguard their privacy. Accessing and using Swinburne Vietnam academic department video documentation required ethical approval. The researchers followed privacy rules. Debriefings allowed participants to ask questions and clarify the study procedure after interviews and observations. We minimized participant damage and pain. Researchers cared about participants and provided a friendly environment during data collection. The research

procedure was transparent. The study progress and any unexpected events were notified to participants.

RESULTS

1. Finding 1

This section presents the first finding from a study on how various educational methods foster CT among students in the Global Citizen Program at Swinburne Vietnam. Through interviews, document analysis, and classroom observations, the study explores the impact of methods such as peer review, reflective writing, case studies, teamwork projects, creative idea labs, mini-research projects, and debates. Student insights illustrate how these methods enhance analytical skills and deepen understanding across different learning contexts.

Critical thinking through peer review fosters constructive feedback, encourages questioning, and promotes analysis of peers' work. Structured guidelines for reviews can guide students to evaluate arguments, evidence, and reasoning, thereby developing their analytical skills. Additionally, facilitating class discussions after peer reviews helps students reflect on diverse perspectives, deepening their understanding and refining their CT abilities.

> *According to Interviewee #1, who studied in the class GC 5.7, it is said: "My instructor cultivates a positive feedback environment, urging inquiry and endorsing the evaluation of classmates' efforts."*

> *Interviewee #3 highlighted the importance of his teachers in assessment: "I believe my teacher makes us think better by having group talks after we review each other's work. This makes us consider different viewpoints, understand things better, and improve how we think."*

Critical thinking through reflective writing prompts students to analyze their thought processes, assess personal biases, and articulate insights gained from learning experiences. Assignments that require students to connect new information with prior knowledge encourage a deeper understanding and application of concepts. Feedback on reflective writing should guide them in refining their analytical skills, fostering a habit of questioning, and developing a more nuanced approach to problem-solving.

> *Interview with Student #3, Class GC 6.7, at Swinburne Vietnam Ho Chi Minh, revealed: "Writing reflections encourages me to think about how I approach things, consider my own biases, and express what I've learned from my experiences."*

> *Interviewee #11 stated: "Teachers' comments on reflective writing can help me get better at thinking, make me a habit of asking questions, and become more skilled at solving problems in a thoughtful way."*

Critical thinking through case studies helps students identify and explain case concerns. It encourages thorough data collection to deepen context understanding. Teachers help students analyze key facts by judging their importance and relevance to the case. They also promote practical understanding by applying theoretical ideas to real-world situations. They also encourage students to investigate alternative perspectives and solutions. Foresight and strategic thinking are encouraged by having students analyze the likely outcomes of alternative decisions. Through these steps, teachers can help students develop a complete and analytical problem-solving strategy to strengthen their CT.

> *Interviewee #12, Class GC 5.7 said: "Our teacher assigned case studies. These taught us CT by providing real-life examples, having us examine difficult circumstances, offering us issues to answer, and improving our topic knowledge. I should discuss how case studies help me see things differently and make better decisions.*
>
> *For example, Student #15 in class 6.9 illustrated that: "A green project case study can teach you about sustainability, environmental impact assessment, and eco-friendly techniques. I may learn about the advantages and cons of being green, resource conservation, and how businesses and communities can aid the future. I might also learn how innovation, technology, and collaboration can help us achieve our environmental goals."*

Critical thinking through teamwork projects assigns complex tasks that require analysis, problem-solving, and collaboration. Encouraging discussions, diverse perspectives, and periodic reflections can also foster CT skills.

> *From Student #5's perspective, he said: "Teamwork can provide a platform for diverse skill sets to come together, fostering a collaborative learning environment. It allows for the exchange of ideas, promotes effective communication, and enhances problem-solving skills."*
>
> *Interviewee #9, Class 6.9, said: " I can learn more about different points of view and how to use each person's skills in a group setting. Teamwork also helps students get ready for professional settings where they will need to work together, which is good for their personal and professional growth as a whole"*

Critical thinking in creative idea labs promotes open-ended projects encouraging innovative ideas. Creating a supportive environment, providing diverse resources, and encouraging experimentation can help students develop analytical and problem-solving skills while exploring creative ideas. Regular feedback and discussions further enhance their CT capabilities.

> *According to Interviewee #17, Class GC 5.9: "Participating in creative idea laboratories may provide valuable feedback that underscores the progress made in terms of problem-solving and innovation capabilities. The interactive and hands-on nature of the laboratories intrigues me, particularly how it fosters students' creativity."*

> *"When people give me good comments on my work, I feel like I have more power to come up with and explain my own ideas. Additionally, I might value the chance to work with others because it builds community and makes learning easier for everyone. Feedback may generally stress how important creative idea labs are for encouraging a creative and proactive mindset." (Interviewee #20, Class GC 6.7)*

Critical thinking through mini-research projects assigns topics that require analysis, evaluation, and synthesis of information. Emphasizing the importance of reliable sources, guiding them in identifying research issues, formulating research questions, searching for innovative solutions, and encouraging independent inquiry can foster CT. Additionally, discussing findings and implications in a collaborative setting can deepen their analytical skills.

> *As interviewee #8, Class GC 6.7, pointed out: "I think that mini-research projects are helpful because they help students improve their research skills, CT, and knowledge of the topic. I'm thankful for the hands-on training that lets me use what I've learned in the classroom in real life."*

> *From Interviewee #9 perspective, he said: "The study process helped me get better at managing my time, staying organized, and giving presentations. I also think that small research projects help students learn more about the complexities and subtleties of their field of study, which prepares them for future larger research projects."*

Critical thinking through debate challenges assigns thought-provoking topics that require in-depth research and analysis. The debates encouraging students to construct well-reasoned arguments, consider opposing viewpoints, and defend their positions fosters analytical skills. Providing feedback on logic and evidence presentation

> *"By taking part, I improved my public speaking, critical thought, and ability to explain and defend my points of view. Structured reasoning helps me get better at persuasion when I talk to people." (Reported by interview #20, Class GC 6.9)*

> *"Positive feedback could also mention the growth of research and analytical skills through debates since we often have to look at a subject from different points of view. I also believe that arguments help people understand other points of view better and make them stronger when they have to deal with tough conversations." (Reported by interview #15, Class GC 6.7)*

2. Finding 2

Finding 2 explores how teachers in the Global Citizen Program at Swinburne Vietnam prioritize CT by employing diverse instructional strategies. These educators encourage open-ended questioning, promote discussions that challenge assumptions, and assign tasks emphasizing analysis and problem-solving. By fostering an environment where students explore multiple perspectives and develop independent thinking skills, these teachers play a pivotal role in enhancing students' analytical abilities and nurturing their growth as thoughtful learners.

Teachers who are aware of CT often encourage open-ended questions, promote discussions that challenge assumptions, and assign tasks that require analysis and problem-solving. They foster an environment where students are encouraged to explore different perspectives, supporting the development of independent and thoughtful thinkers.

Teachers who prioritize CT often employ methods like inquiry-based learning, problem-solving projects, discussions that encourage analysis, use of real-world examples, promoting active participation, and providing constructive feedback to guide students in developing their reasoning and analytical skills.

Teachers fostering CT exhibit behaviors such as asking probing questions, actively listening to students' perspectives, encouraging open dialogue, acknowledging diverse viewpoints, guiding students to support their ideas with evidence, promoting a growth mindset, and adapting lessons to stimulate independent thought and problem-solving.

Teachers emphasizing CT often use assessments that go beyond rote memorization. They might employ methods like project-based assessments, essays requiring analysis and interpretation, class discussions, problem-solving tasks, and tests that assess not only knowledge but also the application of CT skills. Feedback is typically constructive, encouraging students to reflect on their thought processes and improve reasoning skills.

A teacher's emphasis on CT is closely tied to self-developing techniques in teaching. Teachers committed to fostering CT engage in continuous professional development, staying updated on educational strategies, incorporating feedback from their teaching experiences, and actively seeking new methods to enhance students' analytical skills. This reflective and adaptive approach to teaching aligns with the ongoing process of self-improvement and development (see Figure 1).

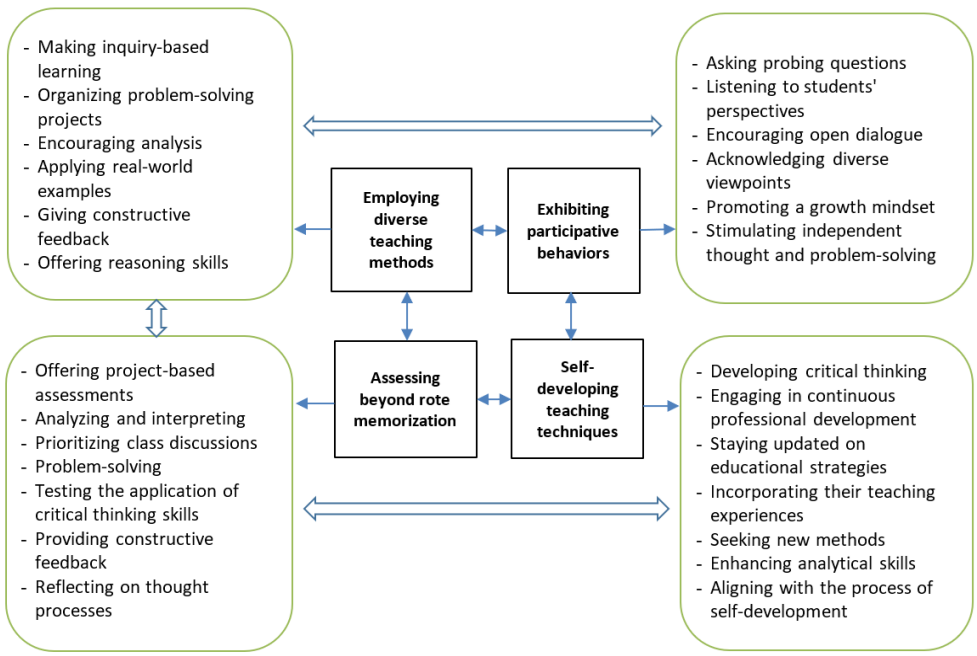

Figure 1 The framework of assessment strategies of teachers with CT awareness

3. Finding 3

Finding 3 investigates the strategic integration of CT into the Global Citizen Program at Swinburne Vietnam through explicit alignment with learning outcomes, objectives, and assessments. By embedding CT prominently in program learning outcomes (PLOs) and course outlines, educators ensure that students understand and actively engage with CT throughout their coursework. This approach not only emphasizes the importance of CT skills but also enhances their application through various assessment methods, classroom activities, feedback mechanisms, and collaborative learning initiatives. Table 1 illustrates effective strategies employed to foster CT across the curriculum, highlighting a comprehensive framework designed to promote students' analytical capabilities and holistic development.

Table 1

Critical thinking in program learning outcomes and incorporating it into course outlines

Items	Explanation	Examples
Program Learning Outcomes (PLOs)	- Include specific PLOs that highlight the development of CT skills.	- Students will demonstrate the ability to analyze and evaluate information critically.
Course Objectives	- Clearly state course objectives that align with PLOs regarding CT.	- Students will apply CT skills to analyze complex problems.
Assessment Methods	- Design assessments that measure CT. - Clearly link assessments to PLOs and course objectives related to CT.	- Students will do tasks like case studies, research projects, or problem-solving exercises.
Classroom Activities	- Integrate activities that promote CT. - Encourage students to question, analyze, and synthesize information during class.	- Students will have discussions, debates, or group projects that require analysis and interpretation.
Resources	- Provide resources that support the development of CT.	- Teachers recommend readings, articles, or multimedia that challenge students' perspectives.
Feedback Mechanism	- Develop a feedback system that focuses on CT. - Provide constructive feedback on students' reasoning, analysis, and problem-solving skills.	- Teachers provide students with rubrics and guidelines outlining the specific components of CT.
Learning Support	- Offer support for students to enhance their CT.	- Teachers conduct workshops or provide additional resources to improve analytical skills.
Integration Across Courses	- Ensure a coherent approach to CT across various courses in the program.	- Collaborate with colleagues to reinforce and build upon CT skills throughout the curriculum.

DISCUSSION AND CONCLUSIONS

Critical thinking remains a multifaceted construct with no universally agreed-upon definition, yet it fundamentally involves intellectually engaged, skillful, and responsible thinking rooted in personal experience, knowledge, reasoning, and analytical capabilities (Niu et al., 2013). This research contributes to the ongoing discourse by shedding light on the complexities of defining and operationalizing CT within educational contexts.

Educators widely acknowledge CT as a crucial skill for undergraduate students and essential for navigating complex job roles (DeAngelo et al., 2009). However, uncertainties persist regarding the most effective methods for teaching and assessing CT (Huber & Kuncel, 2016). This study addresses these gaps by exploring innovative approaches to integrating CT into educational practices.

Several challenges hinder the evaluation and cultivation of CT skills, including the lack of specific training for instructors in teaching and assessing these skills (Stiggins et al., 1989). Carter (1984) notes the disparity between creating assessments that measure rote knowledge versus higher-order thinking skills, suggesting a need for targeted training and resources to enhance CT assessment practices. Snyder and Snyder (2008) identify various barriers impeding students' CT development, such as inadequate instructor training and unproductive learning environments. This study proposes a novel framework for educators to adopt more critical assessment practices, aligning with calls for pedagogical innovation in CT education.

Despite the availability of standardized tests like the Watson & Glaser (1980), CT Appraisal and Cornell CT Tests, empirical studies on classroom-based assessment strategies to foster CT abilities remain limited (Ennis et al.,1985; Facione, 1990). This research fills this gap by presenting findings from an empirical study conducted in Vietnam, providing context-specific insights into CT assessment within the Global Citizen Program at Swinburne Vietnam.

Theoretically, this study advances understanding by examining how project-based learning influences CT skills among undergraduate students. It underscores the importance of creative pedagogical strategies in cultivating CT competencies, reinforcing the need for robust assessment tools to measure these skills accurately (Rogers, 2023). Practically, the findings support evidence-based educational strategies that enhance CT across disciplines, empowering educators to develop curricula focused on CT. By bridging theory and practice, this research equips stakeholders - from educators to policymakers—with tools to foster lifelong CT development beyond formal education settings (Halpern, 2014).

In conclusion, this research underscores the pivotal role of CT in preparing students for complex challenges in academia and the workforce. By integrating critical perspectives and building on previous scholarly works, this study contributes to educational practices, policy decisions, and professional development, promoting holistic student development and readiness for future endeavors.

LIMITATIONS

This research has certain limitations. One potential consequence of selection bias arises when the selected participants may not accurately represent the entire population, rendering the findings inapplicable to individuals with diverse characteristics or experiences. Observer bias may occur if behaviors are influenced by the presence of an observer, altering the natural classroom environment. Despite these constraints, this research establishes a foundation for future investigation into CT assessment strategies. Future research could enhance their breadth

by adopting a mixed-methods approach, further developing the framework established in this study. Additionally, further research that integrates and applied the conceptual insights from this study could result in the development of large-scale tests using a quantitative approach.

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