Journal of Education and Learning; Vol. 14, No. 3; 2025
ISSN 1927-5250 E-ISSN 1927-5269
Published by Canadian Center of Science and Education

Critical Thinking in the Classroom: Faculty Perspectives and Practices

J. Silva[1], J. Edmond[2] & C. Jauregui[3]

[1] Department of Health Management, Economics and Policy, School of Public Health, Augusta University, USA.

[2] Department of Teaching and Leading, College of Education and Development, Augusta University, USA.

[3] Department of Oral Biology and Diagnostic Sciences, Dental College of Georgia, Augusta University, USA.

Correspondence: C. Jauregui, Department of Oral Biology and Diagnostic Sciences, Dental College of Georgia, Augusta University, Augusta, GA, 30912, USA.

Received: August 13, 2024 Accepted: October 22, 2024 Online Published: January 14, 2025

doi:10.5539/jel.v14n3p1 URL: https://doi.org/10.5539/jel.v14n3p1

Abstract

This research paper explores critical thinking in higher education from the instructors' perspective. A customized survey examined how educators perceive, integrate, and evaluate critical thinking within their courses. Using Bloom's Taxonomy, analysis, and discussion will focus on the views of faculty from various disciplines in a mid-size southeastern university on critical thinking and teaching. The study found that faculty believes they are incorporating critical thinking in their courses and that critical thinking is an essential skill; at the same time, they believe critical thinking is not happening in their classroom. Students' lack of motivation and understanding of what critical thinking is and how to assess it are some barriers laid out by faculty to justify why they have difficulties incorporating it in the classroom. The lack of a consensus on a definition and not having a standardized assessment tool make the issue even more difficult. In addition, faculty also believe that lack of training and time are significant contributors to worsening the problem. In conclusion, a clear definition of critical thinking and how it should be taught and assessed is needed. In addition, faculty need time and support to develop and integrate critical thinking skills into their teaching.

Keywords: critical thinking, faculty, higher education, teaching

1. Abstract

Critical thinking is a concept often emphasized in higher education instruction. The University System of Georgia (USG) highlighted the importance of producing students who can problem-solve, think creatively, and know how to learn in their 2025 strategic plan (University System of Georgia, 2024). The 2025 Strategic Plan has five core priorities: Learning, Discovery, Student Success, Community and Stewardship. Producing students who can think creatively and critically is explicitly stated under the plan for Student Success. The term critical thinking is an umbrella term encompassing numerous skills, and the definition of critical thinking has not yet reached a defined, agreed definition. Halpern (1998) stated that critical thinking is the deliberate use of skills and strategies that increase the probability of a desired outcome and can be learned in ways that promote transfer to novel contexts. Kuhn (1999) defines critical thinking as a developmental model involving three forms of mental processes: metacognition, meta-strategy, and epistemology. Metacognition is thinking about one's own thinking. Meta-strategy is the conceptualization, logistical analysis and strategies themselves formulating the best plan to achieve a goal, rather than individual actions. Epistemology is the study of knowledge and how we know what we know.

Key to remember is that the term critical thinking itself encompasses numerous skills. For example, if you ask generative A.I. to list the skills required to think critically, it will quickly provide a list of 15 individual skills required: analysis, evaluation, interpretation, inference, explanation, problem-solving, creativity, reflection, curiosity, metacognition, active listening, communication, open-mindedness, skepticism and decision-making (OpenAI, 2024). These individual skills all provide a view of how complex it is in defining critical thinking. In addition, several scholars have proposed different approaches to conceptualizing critical thinking, including psychological, philosophical, and educational. The psychological perspective emphasizes cognitive abilities and mental processes (Lai, 2011), while the philosophical approach focuses on the outcomes or results of critical thinking (Paul & Elder, 2009). Critical thinking entails reflective and reasonable thinking, concentrating on determining what to believe or do. Lastly, the educational approach, which is often used interchangeably with Bloom's taxonomy, is based on higher-order thinking skills, including analysis, synthesis, and evaluation,

corresponding to levels of complexity in thinking (Wilson, 2016). As shown by the descriptions above, there is a lack of consensus on what critical thinking means across academic disciplines, so further examination is necessary to confirm its usefulness in higher education.

Moreover, critical thinking in the classroom involves applying rational criteria to reasoning. This process involves asking questions, analyzing sources of information, and drawing reasonable conclusions (Browne & Freeman, 2000). It appears that defining critical thinking involves various conceptual challenges. According to Moore (2013), critical thinking can be defined in multiple ways, including judgment, skepticism, originality, sensitive reading, rationality, activist engagement, and self-reflexivity.

Critical thinking goes beyond just understanding concepts; it's about having a conversation, either with others or within yourself, where people share ideas, challenge each other, and think ahead about possible arguments or responses (Kuhn, 2019). Critical thinking means intellectual diversity, recognizing and valuing different ways of thinking. It is closely linked to rational thinking and plays a key role in shaping who we are (Doddington, 2007). Finally, critical thinking is the process of using your mind to actively and skillfully understand, apply, analyze, combine, and assess information to shape your beliefs and decisions, guided by common intellectual principles (Duldt, 1994). The studies suggest that critical thinking is a complex process that involves metacognition, reflective judgment, the application of rational criteria and standards, and the development of skills that can be applied to different situations. This process is aimed at improving the likelihood of reaching logical conclusions by systematically analyzing information and arguments.

2. Literature Review

2.1 Incorporating Critical Thinking into the Course and Teaching

As described previously, critical thinking is often misunderstood or neglected due to the lack of consensus on its definition. Faculty can believe they are teaching and applying critical thinking in their classroom when they are not. Additionally, faculty members, who themselves might not have received formal training in critical thinking education, may find it challenging to integrate critical thinking into the curricula effectively (Saeed, 2017). The current literature is fragmented and theoretical about this topic, which exacerbates the issue. In addition, it fails to explain what it means and how to apply and integrate critical thinking into a course.

However, evidence of faculty incorporating critical thinking in their courses is recorded in the literature. For instance, in a study by Ennis (2018), it was reported that in a proposed program to enhance students' subject-matter knowledge and abilities through a year required first-year course, faculty would incorporate critical thinking across the curriculum, culminating in a written senior thesis/project. This innovative curriculum involved an investigative process, where students would take and defend a position on an issue, reinforcing their critical thinking abilities and increasing subject-matter knowledge.

In higher education, a critical approach to critical thinking skill development can lead to increased self-awareness and a more thoughtful, enquiring, and open-minded approach in both professional and personal life (Walker & Finney, 1999). Moreover, critical thinking is an essential skill in medical education. For instance, nursing faculty perceived that they teach critical thinking through several approaches, such as asking questions, reviewing written assignments, conducting clinical conferences, and evaluating student journals using various teaching strategies (Twibell et al., 2005). Faculty also incorporate critical thinking into their courses by using methods and assignments to develop these skills and technology-enhanced learning environments, such as classroom response systems and online discussion forums. Technology-enhanced learning, including classroom response systems and online discussion forums, positively impacts undergraduate nursing students' critical thinking development and engagement in learning (Swart, 2017).

Abrami (2008) argues that effective instruction should explicitly include critical thinking objectives in courses and training, including faculty development activities. Thus, faculty development programs that enhance critical thinking skills can lead to instructional changes in 63% of participants' presentations if evidence-based pedagogies are followed (Behar-Horenstein, 2009). Consequently, faculty should use methods to facilitate critical thinking in the classroom, including course organization, reading assignments, and exam preparation (Nelson, 2017). In conclusion, these studies suggest that faculty should incorporate critical thinking into their courses through various methods, such as assignments, technology, and specific teaching approaches, with the intention of fostering these skills for both academic and professional development.

Incorporating critical thinking in teaching is important as it improves students' and teachers' critical thinking skills and dispositions. Effective critical thinking practices in teacher education programs depend on personal, methodological, and contextual factors (Lorencová et al., 2019). Incorporating critical thinking into teaching

promotes the transfer of knowledge to new contexts and is essential for achieving desired outcomes.

2.2 The Role Critical Thinking Plays in the Classroom and Students' Academic Success

Effective classrooms employ clear expectations, timely support, positive feedback, engaging instructions, and teacher training. Additionally, critical-thinking classrooms employ frequent questioning and active learning strategies for problem-solving (Browne & Freeman, 2000), which is critical in 21st-century education. These skills have been found to facilitate the development of increased self-awareness and an open-minded approach among students in both personal and professional contexts. College students are often required to make vital decisions and develop solutions to various challenges, starting with making good decisions about their major and professional ambitions. Therefore, they must develop good critical thinking skills and apply them to the problems they encounter during their education and professional lives.

Critical thinking is essential for higher education, equipping students with the skills they need for successful careers and enhancing their creativity. According to Bazhouni (2018), promoting critical thinking in college students can be achieved through questioning, proper classroom management, written assignments, and classroom discussions. Teachers play a crucial role in fostering students' critical thinking by integrating these classroom attributes. Thus, understanding its role in ensuring success is vital to an effective classroom. Educators have the duty to provide precise and explicit guidelines on how to incorporate critical skills into academic assignments, as these proficiencies are fundamental in students' acquisition of knowledge and competencies. Remember that traditional classrooms are ineffective learning environments, and future learning spaces should be innovative and revolutionary, breaking conventional norms. Integrating critical thinking in the classroom is crucial for narrowing the achievement gap between successful and unsuccessful students.

2.3 Assessing Students' Critical Thinking

Assessing student learning and progress in a course is a crucial process for colleges and universities. Various strategies are employed by administrators and faculty members to evaluate student performance and competencies, depending on each course's learning objectives and goals. This practice may involve different approaches and varies in frequency, length, and objectives. Therefore, colleges and universities invest significant time and effort in evaluating students to ensure their success. A multi-method approach to assess students' learning outcomes is recommended, focusing on knowledge, skills, competencies, and attitudes. However, critical thinking is often overlooked, and few faculty members attempt to evaluate this skill. Moreover, only a few valid tools are available to assess students' critical thinking. Cheung et al. (2002) argue that a reliable measure of critical thinking, which considers cognitive skills, motivational disposition, behavioral habit, and ideological belief, is valid and reliable in evaluating university students' critical thinking abilities.

Employing Bloom's taxonomy as a framework is the preliminary step in developing a valid tool to measure students' ability for critical thinking. Nonetheless, it is not practical to appraise knowledge through multiple-choice queries. It is appropriate to develop an assessment instrument that guarantees both reliability and validity. For instance, Sumarni et al. (2018) state that assessment instruments, such as analytical essays and problem-solving exercises, are both practical and reliable and provide a valid measure of students' critical thinking abilities.

Although providing a definition of critical thinking may prove difficult, its acquisition is widely recognized as an essential skill for success in 21st-century jobs. According to Dwyer et al. (2014), critical thinking is defined as an integrated framework and metacognitive process that enhances the ability to reach logical conclusions and solutions through purposeful and reflective judgment. This definition can be used to innovate the curriculum, particularly at the higher education level. Critical thinking, as described here, emphasizes purposeful and reflective judgment, which is essential for higher-order thinking skills required in higher education. These skills are vital for students as they tackle complex issues, analyze information critically, and make informed decisions in their respective fields. K-12 education emphasizes foundational skills, but higher education demands a more integrated, reflective approach to problem-solving, making this definition particularly relevant for curriculum innovation at this stage. Thus, it is crucial to innovate the curriculum at all levels of the educational system in order to prepare students for the 21st-century socio-economic landscape. Considering this socio-economic landscape, defining critical thinking is a normative enterprise in which appropriate criteria and standards are applied to what students say, do, or write in order to acquire intellectual resources such as foundational knowledge and effective heuristics (Bailin et al., 1999). Examples of such standards that students should demonstrate could be clarity, relevance, accuracy, fairness and logical consistency.

Additional to teaching critical thinking, there is also a need to be able to assess student success. An issue arises in how to formatively assess critical thinking in an unbiased, consistent manner. There are numerous standardized tools available, such as California Critical Thinking Skills Test (CCTST) and the Health Sciences Reasoning Test

(HSRT), but all of them have limitations associated with their use or have limited validation studies performed (Anders et al., 2019). There are also differences in what exact skills these tests assess. For example, the HSRT assesses induction, deduction, analysis, inference, and evaluation skills (Hanlon et al., 2018), compared with the HEIghten Critical Thinking Assessment (HCTA), which assesses analysis and synthesis (Jauregui et al., 2024).

The literature still debates the wide range of definitions and strategies for incorporating and assessing critical thinking. Nevertheless, it is crucial to continue the discussion and explore its progress. Therefore, this study aimed to gain an understanding of how faculty members perceive critical thinking skills in their classrooms, the methods they use to assess them, how they integrate critical thinking into their respective disciplines, and how important they consider it to be for student success.

3. Methodology and Methods

3.1 Setting and Sample

The study was conducted at a mid-sized academic institution in the southeastern United States. Participants were selected through a convenience sampling technique from an institutional faculty email listserv. Faculty members were invited to participate if they met the following criteria: they were full-time or part-time faculty members teaching any academic program or course level during the year 2022. The convenience sampling approach was used to ensure that a diverse range of disciplines and teaching levels were included, allowing us to capture varying perspectives on critical thinking integration in teaching.

The final sample size included 83 respondents, with a response rate of 4.3%. Although this response rate was low, it is consistent with typical participation rates in faculty surveys, which can be affected by time constraints and workload. The low response rate also suggests that the topic of critical thinking may not be prioritized by some faculty members. Institutional Review Board (IRB) approval was obtained prior to data collection (Protocol number: 1861103-2).

3.2 Survey Development and Administration

An online survey was conducted to gather insight into the faculty's critical thinking climate and their perception of the skills being integrated into their classrooms. The survey was sent out through the Office of Institutional Effectiveness to all 1928 teaching faculty at the leading research institution. The sample size was determined by the total number of teaching faculty at the institution. The rank of the faculty, their age, class size, etc. were not considered. The customized online survey was created and conducted through Qualtrics (Provo, Utah, USA) and was open for two months with two reminder emails to participate. Participation was anonymous and voluntary.

The survey was comprised of 22 questions: 17 closed and five open-ended questions. Demographic questions pertaining to age and gender were included. Additionally, questions clarifying the respondent's school/college, subject area, and the level of students taught by the respondent were included. The closed-ended questions used Likert scales to assess the degree of critical thinking integration, while the open-ended questions allowed respondents to provide qualitative insights into challenges and strategies for teaching critical thinking. The main body of the survey was investigating if faculty teach critical thinking, how important these skills are in the classroom, and the tools to assess critical thinking that are being utilized were also investigated (Appendix A). There were three additional questions included regarding faculty willingness to attend faculty development training opportunities on critical thinking.

4. Data Analysis

All statistical analyses were performed using SPSS for Windows (IBM SPSS Statistics 28.0). Missing values that corresponded to refuse to answer were not included in analyses. Descriptive methods were used to describe variables, and frequency statistics were calculated for participant responses to each survey item. Pearson chi-square of independence test was used to analyze the statistical significance between variables. P-value < 0.05 used as significance cutoff.

Responses to the open-ended questions (Questions 5, 19, 20, 21, and 22) were analyzed using a general inductive approach to condense extensive raw text into a summary. Additionally, codes were identified and themes generated to be utilized in agreement tables. Three independent researchers analyzed the data, generated individual codes and themes. Codes and themes were compared, and agreement tables generated. At the end, a consensus table was produced from the three independent tables for each open-ended question (Tables 4–8).

5. Results

5.1 Demographics and Quantitative Analysis

The response rate for the survey was 4.3%. As presented in Table 1, the descriptive research data analysis revealed

that out of the 83 survey participants, 67.5% were female, 28.9% were male, 1.2% identified as non-binary/third gender, and 2.4% opted not to disclose their gender. Notably, most participants were 50 to 59 years old, had a medical background, and the subject area of specialization was healthcare. The second largest group of participants were from the College of Arts, Humanities, and Social Sciences, with expertise in social sciences. Of the total number of participants, 29 individuals taught undergraduate courses, 24 taught graduate-level courses, and the largest part (n = 30) taught professional students. All the participants (100%) reported the inclusion of critical thinking in their respective courses.

Table 1. Participant Characteristics

	N	%
Age		
Not provided	14	16.9
30–39	8	9.6
40–49	16	19.3
50–59	27	32.5
60 and over	18	21.7
Gender		
Female	56	67.5
Male	24	28.9
Non-binary/third gender	1	1.2
Prefer not to say	2	2.4
College/School		
Not provided	1	1.2
College of Allied Health	15	18.1
College of Education	4	4.8
College of Nursing	5	6.0
College of Sciences and Mathematics	9	10.8
Dental College of Georgia	2	2.4
Hull College of Business	3	3.6
Medical College of Georgia	20	24.1
Pamplin College of Arts, Humanities and Social Sciences	21	25.3
School of Computer and Cyber Sciences	3	3.6
Subject Area		
Not provided	2	2.4
Business	2	2.4
Healthcare	26	31.3
Humanities and Fine Arts	5	6.0
Mathematics and Technology	4	4.8
Science	8	9.6
Social Sciences	13	15.7
Other	23	27.7
Students Level		
Graduates	24	28.9
Professional	30	36.1
Undergraduates	29	34.9

According to the findings presented in Table 2 and Figures 1A and B, there is a significant association with gender ($p < 0.001$) and subject area ($p = 0.006$) when it comes to providing students with all the necessary information to learn. Females tend not to believe that effective instructors provide all the information to facilitate student's success. Conversely, social sciences and healthcare faculty are more likely to promote independent learning and do not consider it necessary to provide all information to the students.

Table 2. Comparison of participant'' characteristics between conditions – Chi-square test

Participants' characteristics between conditions	$\chi 2$ df		*Asymptotic Significance (2-sided)*
Gender vs. Do you think you need to give all the information to your students in order for them to learn your subject	23.165	6	< .001
Subject Area vs. Do you think you need to give all the information to your students in order for them to learn your subject	30.700	14	.006
Subject Area vs. How important to you as an instructor is incorporating critical thinking in your teaching?	44.704	14	< .001

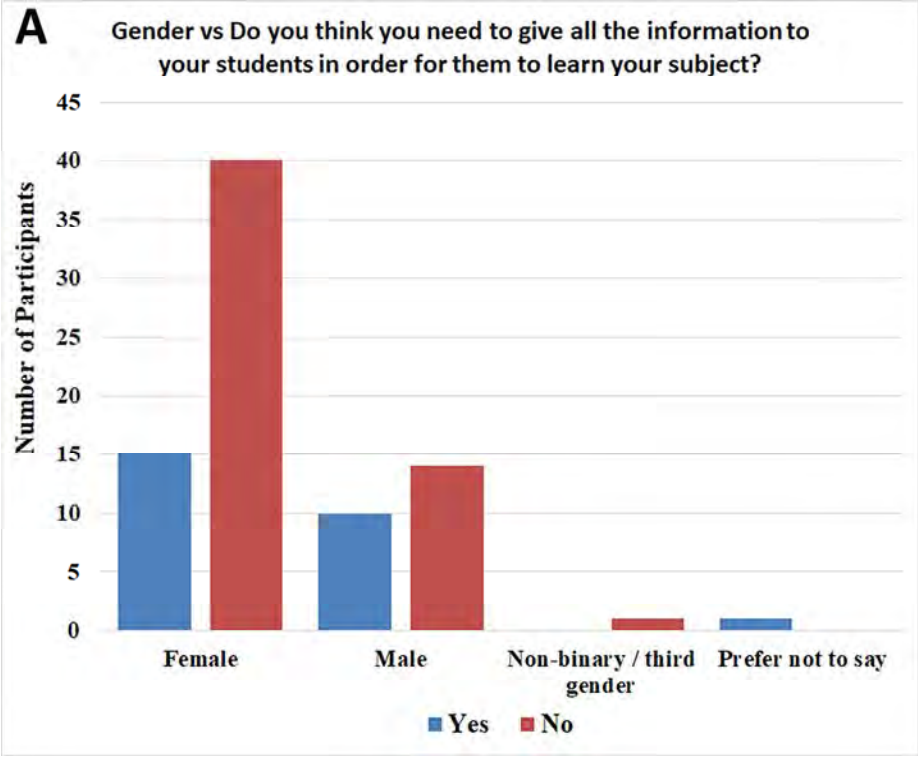

Figure 1A

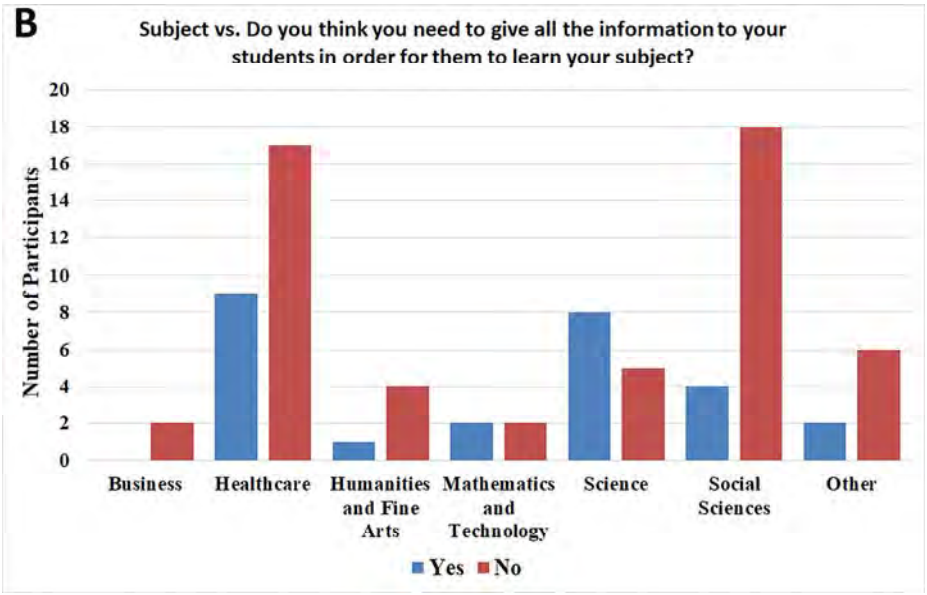

Figure 1B

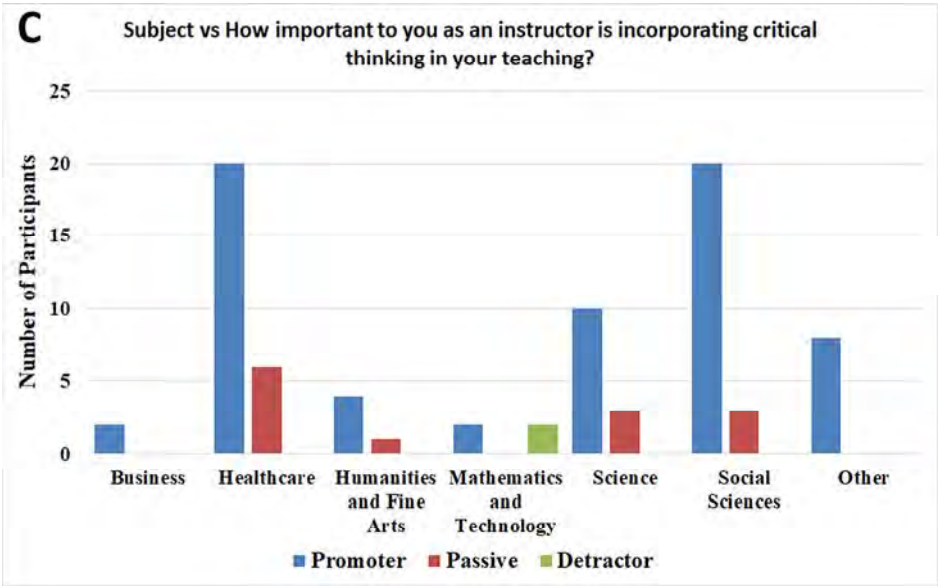

Figure 1C

The survey also asked instructors about the importance of incorporating critical thinking in their teaching. The results showed that 81.9% of the instructors believed that it should be included in their teaching. The survey also found a significant correlation ($p < 0.001$) between faculty views on the importance of critical thinking and faculty's subject matter, with social sciences and healthcare faculty strongly agreeing that critical thinking is important for their teaching (Figure 1C). The role of critical thinking in the classroom was also investigated, along with the importance of the student's ability to think critically, whether critical thinking occurs during teaching, and whether students' critical thinking is assessed formally as part of the course. The results showed that there was no significant correlation between age, gender, or subject matter and the listed conditions (Table 2).

Table 3 documents the survey responses to binary questions. All respondents incorporated critical thinking into their courses. Interestingly, 8.54% of respondents indicated that, despite responding affirmatively to including critical thinking in their teaching, they did not think critical thinking happened in their classroom while teaching. Additionally, more than 10% of respondents did not monitor if critical thinking was happening (12.05%) or assess

students' critical thinking as part of their course (12.2%).

Table 3. Survey responses to binary/general questions

Question	*Answer options*	*# respondents (%)*
Critical thinking in the classroom		
Do you incorporate critical thinking in your courses?	Yes:	83 (100)
	No:	0 (0)
Do you think critical thinking happens in your classroom when you are teaching students?	Yes:	75 (91.46)
	No:	7 (8.54)
Do you monitor if critical thinking is happening in your classes?	Yes:	73 (87.95)
	No:	10 (12.05)
Do you formally assess students critical thinking as part of your course?	Yes:	72 (87.8)
	No:	10 (12.2)
Do you think you need to give all the information to your students in order for them to learn your subject?	Yes:	55 (67.9)
	No:	26 (32.1)
Faculty training		
Would you be willing to attend faculty development training opportunities on critical thinking?	Yes:	67 (81.71)
	No:	15 (18.29)
What format would you prefer for faculty training activities on critical thinking?	Face-to-face:	28 (35.9)
	Online asynchronous:	30 (38.46)
	Online synchronous:	20 (25.64)
Would you be willing to take a formal critical thinking assessment?	Yes:	64 (80)
	No:	16 (20)

As previously alluded to, most faculty indicated that they believed students needed to be provided with all the information to learn the subject being taught (67.9%).

Most faculty were open to attending faculty development activities focused on critical thinking (81.71%). There was no clear preference as to which format they would prefer for such training, with 35.9% preferring face-to-face instruction, 38.46% preferring online asynchronous, and 25.64% opting for online synchronous. Most faculty would be willing to take a formal critical thinking assessment, with only 20% responding negatively.

5.2 Qualitative Analysis

Table 4 describes responses to the question, "What does critical thinking mean to you?" The analysis focused on word frequency used in the participants' responses. Table 4 is the final consensus table from three independent analyses. Based on the responses to open-ended questions, several themes emerged from the analysis: (a) the ability to think objectively; several answers specified the importance of seeing different perspectives and viewing things from multiple dimensions. For example, one of the participants expressed the ability to think objectively as "the ability to objectively analyze and evaluate issues and materials to form a judgment;" (b) metacognition answers indicating the value of thinking out of the box, or 'careful thinking'; (c) problem-solving and analysis were also important to respondents, with the ability to identify and solve problems cited as a key skill. Metacognition and problem-solving were described as "thinking about a matter from many perspectives…thinking deeply and importantly before acting"; (d) analytical thinking, respondents highlighted analyses of problems as a core critical thinking skill; (e) questioning and inquiry, with respondents identifying the ability to develop new questions as beneficial for critical thinking. In addition to being able to "think," faculty also emphasize that critical thinking means to "assess," "analyze," and "ask questions." As one of the respondents stated, "analyze all relevant data with as little prejudice as possible".

Table 4. Agreement table for the qualitative question "What does critical thinking mean to you"

Code	Examples [Direct quotes]	Theme
Ability	- ability to define a problem and develop a logical list of "diagnoses"	Ability to think objectively
	- ability to evaluate all sides of an issue/argument	
	- the ability to objectively analyze and evaluate issues and materials to form a judgment	
	- the ability to use available experience, information and training to assess situations	
	- the ability to and process of systematically analyzing and evaluating information	
Thinking	- identifying problems and thinking through how to solve those problems	Metacognition
	- thinking about a matter from many perspectives…thinking deeply and importantly before acting	
	- thinking out of the box	
	- careful thinking	
	- logical thinking	
Problem	- ability to define a problem	Problem solving and analysis
	- analyze problems, clearly articulate both orally and written issues of the problems, and develop solutions for the problems	
	- problem solving, logic, analysis	
	- systematic problem-solving skills	
Analyze	- objectively analyze and evaluate issues	Analytical thinking
	- gather, compare, contrast, and analyze information	
	- use information you have learned, analyze it, and apply it	
	- analyze all relevant data with as little prejudice as possible	
	- analyze, evaluate, apply and intelligently question	
	- analyze information and to synthesize it	
Questions	- asking questions of and seeking multifaceted answers	Questioning and inquiry
	- post new questions for related problems	
	- develop new questions	
	- understanding the central questions on the subject you are learning	

Table 5 addresses the question, "What problems are faced by students when trying to learn critical thinking?" Table 5 is the final consensus table from three independent analyses. The themes that emerged from the analyses were: (a) barriers to critical thinking; answers indicated that at least some of the issues were students' lack of training in critical thinking, with faculty indicating that some students have not been taught to think; (b) misconceptions/perceptions, with some answers indicating that students either do not believe they are capable of thinking critically or that critical thinking is unimportant. For example, "have a difficult time connecting the dots or applying the information they know" was a question response; (c) challenges in deep and independent learning, with respondents noting that students experience rote learning, with a lack of cumulative knowledge. Faculty also indicated a tendency for students to want to be spoon-fed information and not comfortable thinking independently. Additionally, students lack motivation; for instance, "lack of motivation to try"; (d) lack of knowledge and understanding, and (e) hurdles to fostering proficiency. As stated by faculty, student misconception or lack of understanding regarding what critical thinking is creates barriers for students when faculty are incorporating critical thinking into their courses. For example, "perceptions that critical thinking is not important" was a response to the question. Faculty also agree that students are not being trained to incorporate critical thinking in class and want to take the easy path to learning; for instance, as one respondent stated, "wanting all information handed to them, rather than learning for learning's sake." One interesting response to the question alluded to a lack of knowledge in teachers themselves, not knowing what critical thinking is, or how to teach it.

Table 5. Agreement table for the qualitative question "What problems are faced by students when trying to learn critical thinking?"

Code	Examples [Direct quotes]	Theme
Thinking	- perceptions that critical thinking is not important	Barriers to critical thinking
	- limitations with abstract thinking	
	- Don't want to have the burden of thinking critically	
	- independent thinking "if-the" thinking skills	
	- have not been taught to think	
	- do not understand what critical thinking is	
Critical	- Don't think they know how to think critically	Misconceptions/perceptions
	- critical thinking is higher order, and lower order skills must be developed first or simultaneously	
	- do not reward students' engagement in critical thinking	
Learning	- shallow/rote learning	Challenges in deep and independent learning
	- learning to think on their own	
	- learning how to do it and the limited time	
	- wanting all information handed to them, rather than learning for learning's sake	
	- lack of cumulative learning	
Know	- they don't know the words they want to use	Lack of knowledge and understanding
	- do not know how to assess or analyze information	
	- teachers don't know what it is and don't know how to teach it	
	- they panic and don't know exactly what to expect	
	- they are doing it without knowing what it is called	
	- have a difficult time connecting the dots or applying the information they know	
Lack	- lack of experience	Hurdles to fostering proficiency
	- lack of motivation to try	
	- lack of instruction, lack of practice	
	- lack appropriate conceptual tools	
	- lack of psychological safety and scaffolding of information structures	
	- lack of time due to over burden of the course materials, lack of enthusiasm	
	- lack of cumulative learning	

Table 6 addresses the question, "What problems are faced by faculty when trying to teach critical thinking?" The themes that emerged from the analyses were: (a) teaching challenges and students' engagement, (b) gaps in critical thinking education, (c) challenges in faculty approaches to teaching critical thinking, (d) time constraints, and (e) varying levels of student understanding. As per the consensus of the faculty, one of the primary reasons behind their difficulty in instilling critical thinking skills amongst students was attributed to the lack of student engagement. The respondents echoed this sentiment by saying: "students find it boring and unrealistic," "could make students uncomfortable," Concerning "gaps in critical thinking education," the following was stated, "many people (esp. in Science/Math) THINK they are teaching CT, but they are not teaching discernment but rather problem solving." Faculty also report time constraints as one of the primary challenges they face when teaching critical thinking skills. Educators frequently report this issue as a significant impediment to their efforts to cultivate this essential skill among their students. For instance, "Having enough time to address the lack of understanding and then teach critical thinking."

Table 6. Agreement table for the qualitative question "What problems are faced by faculty when trying to teach critical thinking?"

Code	Examples [Direct quotes]	Theme
Students	- students may be a different levels of understanding	Teaching challenges and student engagement
	- not being able to connect with the students, not being able to articulate proper terminology to the students… not being respected by students for trying to teach it	
	- be perceived by students as 'tough' or potentially offending their biases, students may not understand	
	- could make students uncomfortable. could lead to students reporting the faculty for "unprofessionalism" or "lack of sensitivity"	
	- resistance by students with strong political or other beliefs/bias	
	- getting students to realize facts have utility beyond trivia	
	- students believe they are being "tricked"	
	- students complain, bad evaluations, instructors are labelled as too hard/harsh	
Teaching	- many people (esp. in Science/Math) THINK they are teaching CT, but they are not teaching discernment but rather problem solving	Gaps in Critical Thinking education
	- many SCIENCE faculty think they are teaching critical thinking and they are not	
	- how to incorporate best practices into their teaching routine	
	- resistance to teaching hot button social issues	
	- teaching students how to think rather than what to think	
Faculty	- I don't think faculty know how to teach students to think critically. Many faculty fall back on lecture to get the content across	Challenges in faculty's approach to teaching CT
	- faculty has to push boundaries and give extreme examples… could lead to students reporting the faculty for "unprofessionalism" or "lack of sensitivity"	
	- faculty are simply unable to remember what it is like to know nothing about the topic or the thought processes involved	
	- attack on tenure has put faculty in a position where we fear that pushing students to think too much will result in student complaints	
Time	- time to cover content and practice critical thinking	Time constraints
	- takes more time to develop activities and assignments	
	- having enough time to address the lack of understanding and then teach critical thinking	
	- time and logistical issues. There is only so much time in the classroom and so many students in the classroom	
	- limited contact time and utilization of student study time	
Understanding	- different levels of understanding	Varied levels of student understanding
	- understanding whether the student has readiness for the concepts	
	- having enough time to address the lack of understanding	
	- coming up with exercises/activities/assignments that help students at different levels of understanding /development	

The next question asked the participants to "List the barriers faculty face when teaching and implementing critical thinking in their classrooms. Table 7 is the final consensus table from three independent analyses. The themes generated were as follows: (a) student resistance and variability, (b) time constraints, (c) faculty development and support, (d) knowledge gaps and deficiencies, and (e) enhancing learning and student engagement. As stated by the respondents, "time limitations for each semester, decisions of what to cut to allow time for critical thinking," and "students today arrive to college with less factual knowledge than students a generation or two ago." Faculty also identify that students' resistance and variability coupled with insufficient support for faculty development, represent significant impediments to teaching and implementing critical thinking in the classroom.

Table 7. Agreement table for the qualitative question "List the barriers faculty face when teaching and implementing critical thinking in their classrooms"

Code	Examples [Direct quotes]	Theme
Time	- time required to develop case materials	Time constraints
	- time and resources, large amounts of knowledge students need for standards and requirements, FACULTY DEVELOPMENT and the TIME to do it!!!	
	- takes time to consider adding discussions into the lecture/case	
	- time constraints, a lack of off-stage time when teaching new concepts	
	- time limitations for each semester, decisions of what to cut to allow time for critical thinking	
	- time, inability to involve every student in classroom activities	
	- time, as there is not much to dedicate to the procedural knowledge and skills that critical thinking requires	
Teaching	- teaching Experience, Formal education in teaching	Faculty development and support
	- administrative support of faculty teaching roles	
	- faculty is uncomfortable teaching critical thinking	
	- poor alignment of objectives, teaching, and assessment	
	- Science and math are NOT TEACHING CRITICAL THINKING and yet they are telling students that they are	
Knowledge	- large amounts of knowledge students need for standards and requirements	Theme: Knowledge gaps and deficiencies
	- lack of knowledge on how to write appropriate objectives, design learning activities, and assess	
	- know-how with respect to actually delivering those skills and knowledge effectively, and a lack of knowledge on our part regarding what critical thinking is and requires	
	- student'' insufficient background knowledge in the subject	
	- lack of rich stores of factual knowledge that have been properly "chunked" in working memory of the students	
Learning	- student attitude toward learning or faculty	Enhancing learning and student engagement
	- with the small group learning, we are in a much better place to implement this type of learning	
	- making sure students understand they are learning skills that are valuable	
	- true formative assessments for constructive feedback (assessment for learning, rather than of learning)	
	- finding ways to extend learning into the real world	

The final qualitative analysis question was, " What opportunities and benefits might faculty have when teaching and implementing critical thinking in their classrooms?" The themes generated from the responses are shown in Table 8, respectively. The themes generated were as follows: (a) enhanced student learning and development, (b) professional growth and development for faculty, (c) enhanced learning and academic achievement, (d) improved understanding and comprehension, and (e) support and transformation. The following statements show opportunities and benefits for faculty in their effort to teach and implement critical thinking in their classroom, "opportunity for university would be to place safeguards for faculty so they could teach critical thinking in a protected and kind environment, "growth in learning level, deeper understanding of subject matters therefore higher grades."

Table 8. Agreement table for qualitative question "Which opportunities and benefits might faculty have when teaching and implementing critical thinking in their classrooms?"

Code	Examples [Direct quotes]	Theme
Students	- when it clicks, students seem to respond positively to well-designed critical thinking activities - helping students evolve their thinking, giving students a voice to share their thoughts in a non-judgmental manner, helping students recognize perspective shifts, showing that it's okay to be vulnerable and open and humble - students may be more motivated, feel a greater sense of accomplishment and purpose - joy, satisfaction, challenge, relevant application exercises, good ideas from students - having more faculty include critical thinking into their course in the first 2 years, then students would be more accustomed to thinking this way - should be labeled as such so students understand they are learning, re-learning, or practicing CT - provides the skills that the students need for a deeper, richer understanding of the material - reaching students and helping them think carefully about both course content and their own lives - opportunity- allow students to find the answers independently - helps students prepare to join the work force - student success being the forefront	Enhanced student learning and development
Faculty	- faculty development opportunities–the challenge is time and value placed on it - opportunity for university would be to place safeguards for faculty so they could teach critical thinking in a protected and kind environment - having more faculty include critical thinking into their course in the first 2 years - listening to faculty teaching needs would help - dynamic learning interactions, a stimulating environment for both the students and the faculty	Professional growth and development for faculty
Learning	- pinpoint if a student is learning the course information that is given - Improvement of student learning, retention of information - small Group Learning facilitates this - growth in learning level, deeper understanding of subject matters therefore higher grades - the classes can be more fun for students as they are more interactive, and this can be better for all as long as students understand they are learning - dynamic learning interactions	Enhanced learning and academic achievement
Understanding	- better understanding of course material and life - growth in learning level, deeper understanding of subject matters therefore higher grades - richer understanding of the material	Improved understanding and comprehension
Help	- helping students evolve their thinking, helping students recognize perspective shifts - helps inside and outside the classroom - bringing CT into their classrooms will help them to more fully identify what their students do not understand and why - helps students prepare to join the work force	Support and transformation

6. Discussion

Critical thinking is a crucial skill that students must possess at all levels of education. Although there is no consensus on its precise definition, it is often referred to as the capacity to think analytically and with reason, solve problems, engage in metacognition, and ask thoughtful questions. Our findings align with earlier definitions and highlight the importance of critical thinking in education.

Most respondents to the survey were females (67.5%), aged between 50–59 (32.5%), and were from the healthcare subject area (31.3%). This is reflected in the literature, where the vast majority of articles focused on the teaching and assessment of critical thinking and how to integrate teaching these skills into curricula, originating from the Health Sciences disciplines. For example, recent literature on teaching critical thinking in nursing is readily available (Nguyen et al., 2023; Ateş et al., 2023). Noll et al. (2023) recently looked at curriculum mapping for

critical thinking in nursing to develop clinical judgment. Likewise, researchers from the fields of dentistry and medicine focus on how to integrate and assess critical thinking in clinical education (Alhassan, 2023; Jauregui et al., 2024; Mlika et al., 2023; Nichat et al., 2023). A recent study by Martinez-Moblaln et al. (2023) found that healthcare professionals responsible for nursing student instruction displayed high critical thinking levels. There was a slightly higher score for females compared with males, but the only significant differences in performance on Nursing Critical Thinking in Clinical Practice Questionnaire were in the intellectual and cognitive indicators.

Over the years, teachers have believed they must provide students with all the information to ensure their success. In this study, most faculty indicated that they believed students needed to be provided with all the information to learn the subject being taught (67.9%). Faculty are highlighting the need to present comprehensive information to students as a foundation for learning. However, providing 'all the information' does not equate to fostering critical thinking on its own. As far back as 1999, Kuhn discussed the higher-order cognitive processes required to think critically, that were not achieved by students passively receiving the information (Kuhn, 1999). Critical thinking involves not just receiving information, but engaging with it—analyzing, questioning, and applying it to solve problems or make decisions.

Both teachers and students have expected this traditional approach. In this conventional model of education, the teacher is responsible for providing all the knowledge to students. However, a balance between giving information and ensuring that students acquire it, teachers are exploring other methods to encourage students to become more independent and take responsibility for their own success. As Farahani (2014) pointed out almost a decade ago, student independence is crucial for their success. The argument is to enable students to take charge of their learning, and it is essential to evaluate students' readiness to actively seek the information themselves. However, this mindset of spoon-feeding students still persists in higher education, and our study uncovered a link between females and science and technology faculty members being more likely to believe that this is not the best approach for students to succeed in their classrooms. In addition, students' lack of motivation makes teaching critical thinking challenging. Motivating students to perceive critical thinking as an essential skill of 21st-century education proves to be a struggle for faculty, making it one of the barriers faculty identified to teaching and assessing critical thinking in their classrooms.

Our findings also revealed that case studies are widely used to promote critical thinking in the classroom. Over 60% of faculty in healthcare and social sciences integrate case studies as a primary method for facilitating learning. Unsurprisingly, faculty in healthcare and social sciences were more inclined to promote active student participation in their learning. For example, in healthcare, courses emphasize experiential learning. Students are expected to know the content and necessary skills to become proficient in their professions. In medical education, for instance, experiential learning is used to help students apply their content knowledge and skills into practice (Yardley et al., 2012). In addition, Lisko and O'Dell (2010) emphasize the importance of hands-on experience in developing clinical competence in nursing education. Both authors believe experiential learning is the best way to ensure students become active learners. Similarly, in social sciences, learning involves real-life experiences and service learning. In summary, hands-on experiences through experiential and service learning are emphasized in healthcare and social sciences education, valuing real-life experiences for students to acquire the competencies needed to succeed in the workplace. A recent systematic review of critical thinking pedagogical practices in medical education also found that collaborative learning was frequently used in immersive pedagogical approaches (Araújo et al., 2024).

There has yet to be a consensus about critical thinking and how to assess it. Thus, it was not surprising to learn through our study findings that faculty believe they are implementing critical thinking in their classrooms; however, they have difficulty monitoring and assessing it. There are numerous critical thinking assessment tools available, but they have fee associated with their use, and varying target audiences (Butler, 2024), making them relatively inaccessible and impractical for day-to-day use. Cáceres et al. (2020) highlight that despite extensive research recommending the development of critical thinking, more evidence is needed to show how teachers implement it in the classroom and how to assess it. The challenge in assessing the success of integrating critical thinking into teaching is problematic at every level of education. A recent scoping review of education up to high school level found a large heterogeneity in research published, with poorly reported results (Prokop-Dorner et al., 2024). It therefore becomes challenging for faculty to understand and know what and how critical thinking could be implemented, monitored, and evaluated.

Sullivan et al. (2024) *r*ecently found that faculty and student perceptions of critical thinking differ. Most faculty responded that they were explicitly teaching critical thinking in their classes, whereas the student perceptions were that critical thinking instruction was implicit. Additionally, the exact skills being taught were not comprehended in the same way between faculty and students. Faculty defined critical thinking with skills such as 'analysis,'

whereas students were more focused on viewpoints and biases.

The umbrella term 'critical thinking' can also be over-simplistic, and very few of the accompanying skills were mentioned in the survey responses. When evaluating critical thinking, differences are often seen between different skills under the critical thinking umbrella. Wu et al. (2023) found that nursing students scored highly on the inquisitiveness scale but were not as strong on systematicity, self-confidence, or truth-seeking.

Our study supports previous findings that faculty in higher education are overwhelmed with significant demands such as teaching, research, service, and administrative duties, making it difficult to integrate innovative teaching practices. Faculty need help prioritizing critical thinking-based education due to the pressure and lack of time and training. This limited time for faculty to dedicate to developing and assessing critical thinking in an inquiry-based environment is primarily due to time constraints. Thus, integrating innovative activities in the classroom is demanding and time-consuming, hindering the adoption of an inquiry-based learning approach. Faculty have numerous demands on their time, with diverse priorities within faculty groups. For example, when surveyed, the majority (64%) of research faculty at one institution cited inadequate time as a limiting factor in their activities (Nejatizadeh et al., 2016). There are also gender differences; a recent study found that females report more teaching and service time than males, who reported higher research time (Allen et al., 2023).

Sullivan et al. (2024) identified the differing perceptions of what critical thinking is between faculty and students. The lack of a universally accepted definition, with required skills documented for critical thinking, is problematic. It makes standardization or systematic assessment of critical thinking in higher education difficult and introduces variability and subjectivity to how Critical Thinking is taught and assessed. A study investigating faculty's understanding of critical thinking concepts and instruction in higher education found that faculty's knowledge and perception of critical thinking were lacking, and faculty themselves required further education (Adams-Pope & Stedman, 2012).

The need for our students to possess the ability to think critically has never been more critical. We are surrounded by noise, often including misinformation, disinformation, and unsubstantiated claims. There is an increasing body of work directly correlating an individual's ability to think critically with their ability to avoid misinformation and conspiracy theories (Bensley, 2023; Fiordelli et al., 2023; Lantian et al., 2021). There are cultural challenges involved in teaching critical thinking, and conflicting perceptions can be detrimental to students' success. The perception of teachers as strictly knowledge transmitters and the belief that critical thinking is, by definition, an adversarial process can both provide challenges in critical thinking instruction (Tan, 2017).

One of the limiting factors determining whether faculty integrate evidence-based thinking in their teaching is the availability of support. A recent study found that having supportive colleagues and access to resources was the biggest predictor of the presence of evidence-based thinking in teaching, more than time or space constraints (Bathgate et al., 2019). Institutional leadership has been identified as a key factor influencing the incorporation of evidence-based thinking in Nursing education (Elsheikh et al., 2023). Supportive Institutional factors such as the ability of faculty to communicate personal needs, feeling valued, and departmental support for faculty well-being play an important role in ensuring faculty do not 'burnout' (Duke et al., 2020). Faculty Development activities can play a key role in facilitating the integration of critical thinking in curricula (Loving & Wilson, 2000). In the survey, most faculty indicated willingness to participate in workshops and training sessions centered around critical thinking instruction. They need the resources and time made available to them for this to occur.

7. Limitations and Future Research

There were some obvious limitations to the study. Firstly, the number of respondents was low, 4.3%. This is telling in itself. Faculty do not have time. Additionally, faculty get overwhelmed with the number of communications and requests from the university administration. The response rate would seem to indicate that critical thinking is not a subject that faculty feels passionate about. The importance of faculty enthusiasm when incorporating critical thinking in their teaching has been previously discussed (Tsui, 2001). Such endeavors invariably require an increased time-commitment from faculty to facilitate the incorporation of critical thinking in their courses. Giving faculty the resources and time to develop the skills and knowledge required by embracing faculty development can greatly impact educators' willingness to learn and incorporate critical thinking skills in their teaching (Behar-Horenstein et al., 2009). However, it is worth noting that response representativeness is more important than response rates (Cook et al., 2000). The survey had representation from a diverse array of university schools and departments. Additionally, low survey response rates are not necessarily associated with biased results (Rindfuss et al., 2015).

The survey was self-reported, meaning there was no way to monitor accuracy or bias, an acknowledged issue with survey tools (Stratton, 2015). It is difficult to prevent respondent bias with our survey format. Finally, the results

are not necessarily generalizable, as only one institution was investigated.

This work was carried out by the Critical Thinking sub-committee of the Faculty Development Committee of the University Senate. The sub-committee's ultimate aims are: (a) to provide development tools for faculty to assist them in the integration of critical thinking instruction and assessment into their teaching; and (b) to inform leadership decisions that will facilitate faculty being supported in this endeavor. To this end, a student survey is being carried out to gain perspectives on critical thinking instruction from the individuals receiving it.

8. Conclusion

Critical thinking is a concept that is still not well understood, making it more challenging to monitor and assess. Additionally, faculty do not have the time and training to develop, implement, and evaluate critical thinking in their classroom. Faculty perceptions that students need to be spoon-fed with the information required for academic success and lack of student motivation were listed as critical barriers that must be overcome to facilitate the development and implementation of critical thinking in the classroom. Support from the institution was also listed as one crucial issue. Thus, giving faculty time and resources to acquire the knowledge and skills about critical thinking and how to incorporate it in lectures will be a step forward to improve faculty teaching practices and students' understanding of the concept and why they should embrace learning critical thinking skills to enhance their learning experiences.

Acknowledgments

We greatly appreciate the valuable contributions of the Faculty Senate Faculty Development Committee, and Critical Thinking Sub-committee members. We would also like to thank the Center for Writing Excellence for proof-reading the manuscript and every faculty member who took the time to participate in this study.

Authors' contributions

Dr. Jauregui and Dr. Silva were responsible for the study design and revising. Dr. Jauregui was responsible for data collection. Dr. Silva was responsible for statistical analysis of quantitative data. Dr.s Edmond, Jauregui and Silva were responsible for statistical analyses of qualitative data. Dr.s Jauregui and Silva drafted the manuscript and Dr.s Edmond, Jauregui and Silva revised it. All authors read and approved the final manuscript.

Funding

This work was not funded.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

References

Abrami, P. C. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research*, *78*(4), 1102–1134. https://doi.org/10.3102/0034654308326084

Adams-Pope, B., & Stedman, N, (2012). Identifying faculty's knowledge of critical thinking concepts and perceptions of critical thinking instruction in higher education. *NACTA Journal*, *56*, 9–14.

Alhassan, A. (2023). Assessing the Critical Thinking and Deep Analysis in Medical Education Among

Instructional Practices. *Advances in Medical Education and Practice*, *14*, 845–857. https://doi.org/10.2147/AMEP.S417649

Allen, T. D., Miller, M. H., French, K. A., Kim, E., & Centeno, G. (2023, May). Faculty time expenditure across research, reaching, and service: Do gender differences persist? *Occupational Health Science*, *7*, 805–818. https://doi.org/10.1007/s41542-023-00156-w

Anders, P. L., Stellrecht, E. M., Davis, E. L., & McCall Jr., W. D. (2109). A systematic review of critical thinking instruments for use in dental education. *Journal of Dental Education*, *83*(4), 381–397. https://doi.org/10.21815/JDE.019.043

Araújo, B., Gomes, S., & Ribeiro, L. (2024). Critical thinking pedagogical practices in medical education: a systematic review. *Front Med (Lausanne)*, *11*, 1358444. PMID: 38947238; PMCID: PMC11211358. https://doi.org/10.3389/fmed.2024.1358444

Ateş, N., Erdal, N., & Harmancı Seren, A. K. (2023, October). The relationship between critical thinking and job performance among nurses: A descriptive survey study. *International Journal of Nursing Practice*, *29*(5). https://doi.org/10.1111/ijn.13173

Bailin, S., Case, R., Coombs, J. R., & Daniels, L. B. (1999). Conceptualizing critical thinking. *Journal of Curriculum Studies*, *31*(3), 285–302. https://doi.org/10.1080/002202799183133

Bathgate, M. E., Aragón, O. A., Cavanagh, A. J., Frederick, J., & Graham, M. J. (2019). Supports: A key factor in faculty implementation of evidence-based teaching. *CBE—Life Sciences Education*, *18*(2), 1–9. https://doi.org/10.1187/cbe.17-12-0272

Bazhouni, M. (2018). Integrating critical thinking skills in higher education. *Education and Linguistic Research*, *4*(65). https://doi.org/10.5296/elr.v4i1.12964

Behar-Horenstein, L. S. (2009). Promoting the teaching of critical thinking skills through faculty development. *Journal of Dental Education*, *73*(6), 665–675. https://doi.org/10.1002/j.0022-0337.2009.73.6.tb04746.x

Bensley, D. A. (2023, October, 30). Critical thinking, intelligence, and unsubstantiated beliefs: An integrative review. *Journal of Intelligence*, *11*(11), 207. https://doi.org/10.3390/jintelligence11110207

Browne, M. N., & Freeman, K. (2000). Distinguishing features of critical thinking classrooms. *Teaching in Higher Education*, *5*(3), 301–309. https://doi.org/10.1080/713699143

Butler, H. (2024). Predicting Everyday Critical Thinking: A Review of Critical Thinking Assessments. *J Intell.*, *12*(2), 16. PMID: 38392172; PMCID: PMC10890380. https://doi.org/10.3390/jintelligence12020016

Cáceres, M., Nussbaum, M., & Ortiz. (2020). Integrating critical thinking into the classroom: A teacher's perspective. *Thinking Skills and Creativity*, *37*. https://doi.org/10.1016/j.tsc.2020.100674

Cheung, C., Rudowicz, E., Kwan, A., & Yue, X. (2002). Assessing university student general and specific critical thinking. *College Student Journal*, *36*.

Cook, C., Heath, F., & Thompson, R. (2000). A Meta-Analysis of Response Rates in Web- or Internet-Based Surveys. *Educational and Psychological Measurement*, *60*(6), 821–836. https://doi.org/10.1177/00131640021970934

Doddington, C. (2007). Critical thinking as a source of respect for persons: A critique. *Educational Philosophy and Theory*, *39*(4), 449–459. https://doi.org/10.1111/j.1469-5812.2007.00350.x

Duke, N. N., Gross, A., Moran, A., Hodsdon, J., Demirel, N., Osterholm, E., … Pitt, M. B. (2020, January-March). Institutional factors associated with burnout among assistant professors. *Teaching and Learning in Medicine*, *32*(1), 61–70. https://doi.org/10.1080/10401334.2019.1638263

Duldt, B. W. (1994, November-December). Critical thinking. *Nurse Educator*, *19*(6), 9–10. https://doi.org/10.1097/00006223-199411000-00008

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity*, *12*, 43–52. https://doi.org/10.1016/j.tsc.2013.12.004

Elsheikh, R., Le Quang, L., Nguyen N. Q. T., Van P. T., Hung D. T., Makram A. M., & Huy N. T. (2023, September-October). The role of nursing leadership in promoting evidence-based nursing practice. *Journal of Professional Nursing*, *48*, 93–98. https://doi.org/10.1016/j.profnurs.2023.06.007

Ennis, R. H. (2018). Critical thinking across the curriculum: A vision. *Topoi*, *37*, 165–184. https://doi.org/10.1007/s11245-016-9401-4

Farahani, M. (2014). From spoon feeding to self-feeding: Are Iranian EFL learners ready to take charge of their own learning? *Electronic Journal of Foreign Language Teaching*, *11*(1), 98–115.

Fiordelli, M., Diviani, N., Farina, R., Pellicini, P., Ghirimoldi, A., Rubinelli, S. (2023, September). Strengthening adolescents' critical health literacy and scientific literacy to tackle mis- and dis-information. A feasibility study in Switzerland. *Front Public Health*. https://doi.org/10.3389/fpubh.2023.1183838

Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Disposition, skills, structure training, and metacognitive monitoring. *American Psychologist*, *53*(4), 449–455. https://doi.org/10.1037/0003-066X.53.4.449

Hanlon, J. P., Prihoda, T. J., Verrett, R. G., Jones, J. D., Haney, S. J., & Hendricson, W. D. (2018). Critical thinking in dental students and experienced practitioners assessed by the health sciences reasoning test. *Journal of Dental Education*, *8*(9), 916–920. https://doi.org/10.21815/JDE.018.089

Jauregui, C. E., Messer, R., Vitolo, J. M., & Young, N. (2024, April, 27). Evaluating the use of HEIghten critical thinking assessment to monitor critical thinking in dental students. *Journal of Dental Education*. https://doi.org/10.1002/jdd.13550

Kuhn, D. (1999). A Developmental Model of Critical Thinking. *Educational Researcher*, *28*(2), 16–46. https://doi.org/10.3102/0013189X028002016

Kuhn, D. (2019). Critical Thinking as Discourse. *Human Development*, *62*(3), 146–164. https://doi.org/10.1159/000500171

Lai, E. R. (2011, June). Critical thinking: A literature review. *Critical Thinking*, 1–49. Retrieved from https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=b42cffa5a2ad63a31fcf99869e7cb8ef72b44374

Lantian, A., Bagneux, V., Delouvée, S., & Gauvrit, N. (2021). Maybe a free thinker but not a critical one: High conspiracy belief is associated with low critical thinking ability. *Applied Cognitive Psychology*, *35*, 674–684. https://doi.org/10.1002/acp.3790

Lisko, S. A., & O'Dell, V. (2010, March-April). Integration of theory and practice: experiential learning theory and nursing education. *Nursing Education Perspective*, *2*, 106–108.

Lorencová, H., Jarošová, E., Avgitidou, S., & Dimitriadou, C. (2019). Critical thinking practices in teacher education programmes: a systematic review. *Studies in Higher Educatio*n, *44*, 844–859. https://doi.org/10.1080/03075079.2019.1586331

Loving, G., & Wilson, J. (2000). Infusing Critical Thinking into the Nursing Curriculum Through Faculty Development. *Nurse Educator*, *25*(2), 70–75. https://doi.org/10.1097/00006223-200003000-00008

Martínez-Momblan, M. A., Aguilar, I. B., Alonso-Fernández, S., García, M. R., Zuriguel-Pérez, E., Falcó-Pegueroles, A., & Aracil, L. B. (2023, July, 11). Critical thinking among institutional academic advisors and sociodemographic, professional and academic variables: A multicenter correlation study. *Nurse Education Practice*, *71*. https://doi.org/10.1016/j.nepr.2023.103713

Mlika, M., Naceur, A., Kpazai, G., El Mezni, F., Zakhama, L., Labbene, I., & Jouini, M. (2023, July, 5). Is critical thinking potential correlated to critical appraisal skills of medical literature? *Tunisie Medical*, *101*(7), 602–608. https://doi.org/10.3389/feduc.2022.1036627

Moore, T. (2013). Critical thinking: seven definitions in search of a concept. *Studies in Higher Education*, *38*(4), 506–522. https://doi.org/10.1080/03075079.2011.586995

Nejatizadeh, A., Sarnayzadeh, M., Kahnouji, K., Ghasemi, R., & Nakhodaei, N. (2016, May, 25). Constraining factors of research among faculty members at Hormozgan University of Medical Sciences. *Electron Physician*, *8*(5), 2405–2409. https://doi.org/10.19082/2405

Nelson, A. E. (2017). Methods faculty use to facilitate nursing student critical thinking. *Teaching and Learning in Nursing*, *12*, 62–66. https://doi.org/10.1016/j.teln.2016.09.007

Nguyen, T. V., Tang, M. F., Kuo, S. Y., Hu, S. H., Ngoc, T. D. T., & Chuang, Y. H. (2023, October, 26). Nursing students' critical thinking and associated factors in Vietnam: A multicenter cross-sectional study. *Nurse Education Practice*, *73*. https://doi.org/10.1016/j.nepr.2023.103823

Nichat, A., Gajbe, U., Bankar, N. J., Singh, B. R., & Badge, A. K. (2023, November, 3). Flipped classrooms in medical education: Improving learning outcomes and engaging students in critical thinking skills. *Cureus*,

15(11). https://doi.org/10.7759/cureus.48199

Noll, K., Hunt, C., & Jones, M. (2023 September- October). Mapping critical thinking, clinical reasoning, and clinical judgment across the curriculum. *Nurse Education*, *48*(5), 282–286. https://doi.org/10.1097/NNE.0000000000001413

Paul, T., & Elder, L. (2009). The miniature guide to critical thinking concepts and tools. *Foundation for Critical Thinking*. Retrieved from https://www.criticalthinking.org/files/Concepts_Tools.pdf

Prokop-Dorner, A., Piłat-Kobla, A., Ślusarczyk, M., Świątkiewicz-Mośny, M., Ożegalska-Łukasik, N., Potysz-Rzyman, A., … Bała, M. (2024). Teaching methods for critical thinking in health education of children up to high school: A scoping review. *PLoS One*, *19*(7), e0307094. PMID: 39024294; PMCID: PMC11257347. https://doi.org/10.1371/journal.pone.0307094

Rindfuss, R., Choe, M., Tsuya, N., Bumpass, L., & Tamaki, E. (2015). Do low survey response rates bias results? Evidence from Japan. *Demographic Research*, *32*, 797–828. https://doi.org/10.4054/DemRes.2015.32.26

Saeed S. (2017). Evidence-based education: faculty development workshop to promote critical thinking skills in dental education. *Medical Education Portal*, *13*. https://doi.org/10.15766/mep_2374-8265.10600

Stratton, S. J. (2015). Assessing the accuracy of survey research. *Prehospital and Disaster Medicine*, *30*(3), 225–226. https://doi.org/10.1017/S1049023X15004719

Sullivan, A. M., Hayes, M. M., Beltran, C. P., Cohen, A. P., Soffler, M., Cooper, S., … Schwartzstein, R. M. (2024). Do we teach critical thinking? A mixed methods study of faculty and student perceptions of teaching and learning critical thinking at three professional schools. *Medical Teaching*, *46*(11), 1494–1501.

Sumarni, W., Supardi, K., & Widiarti, N. (2018). *Development of assessment instruments to measure critical thinking skills* (p. 349). IOP Conference Series: Materials Science and Engineering. https://doi.org/10.1088/1757-899X/349/1/012066

Swart, R. (2017). Critical thinking instruction and technology enhanced learning from the student perspective: A mixed methods research study. *Nurse Education in Practice*, *23*, 30–39. https://doi.org/10.1016/j.nepr.2017.02.003

Tan, C. (2017). Teaching critical thinking: Cultural challenges and strategies in Singapore. *British Educational Research Journal*, *43*, 988–1002. https://doi.org/10.1002/berj.3295

Tsui, L. (2001). Faculty Attitudes and the Development of Students' Critical Thinking. *The Journal of General Education*, *1*(50), 1–28. https://doi.org/10.1353/jge.2001.0008

Twibell, R., Ryan, M., & Hermiz, M. (2005, February). Faculty perceptions of critical thinking in student clinical experiences. *Journal of Nursing Education*, *44*(2), 71–90. https://doi.org/10.3928/01484834-20050201-06

University System of Georgia. (2024). *College 2025 Strategic Plan – Executive summary*. Retrieved from https://www.usg.edu/college2025/executive_summary/essential_skills

Walker, P., & Finney, N. (1999). Skill development and critical thinking in higher education. *Teaching in Higher Education*, *4*(4), 531–547. https://doi.org/10.1080/1356251990040409

Wilson, L. O. (2016). *Anderson and Krathwohl Bloom's Taxonomy Revised: Understanding the New Version of Bloom's Taxonomy*. Retrieved from https://quincycollege.edu/wp-content/uploads/Anderson-and-Krathwohl_Revised-Blooms-Taxonomy.pdf

Wu, H. L., Lu, D. F., & Tsay, P. K. (2023, May). Critical thinking disposition and influencing factors among new graduate nurses. *Journal of Continuing Education in Nursing*, *54*(5), 233–240. https://doi.org/10.3928/00220124-20230405-08

Yardley, S., Teunissen, P. W., & Dornan, T. (2012). Experiential learning: AMEE Guide No. 63. *Medical Teaching*, *34*(2), 102–115. https://doi.org/10.3109/0142159X.2012.650741

Appendix A

Variable Definitions and Coding Schemes

Variable	Description
Demographics	
Age	1 if 60 or over, 2 if 50 to 59, 4 if 40 to 49, 4 if 30 to 39
Gender	1 if Male, 2 if Female, 3 Non-binary, 4 if Prefer not to say
Institutional Characteristics	
School/College	1 if *CAHS, 2 if Education, 3 if Nursing, 4 if Sc and Math, 5 if Dental, 6 if Business, 7 if Medical, 8 if Arts, Hum, and Social Sci, 9 if Comp and Cyber Sci
Subject	1 if Humanities and Fine Arts, 2 if Sciences, 3 if Math and Tech, 4 if Social Sci, 5 if Business, 6 if Healthcare, 7 if other
Degree Level	1 if Undergraduate, 2 if Graduate, 3 if Professional
Critical thinking in the classroom	
Do you incorporate critical thinking in your courses?	1 if No, 2 if Yes
How important to you as an instructor is incorporating critical thinking in your teaching?	1 if Detractor, 2 if Passive, 3 if Promotor
How much of a role does critical thinking play in your classroom?	
How important to you as an instructor is a student's ability to critically think?	1 if Detractor, 2 if Passive, 3 if Promotor
Do you think critical thinking happens in your classroom when you are teaching your students?	1 if Detractor, 2 if Passive, 3 if Promotor
Do you monitor if critical thinking is happening in your classes?	1 if No, 2 if Yes
Do you formally assess students critical thinking as part of your course?	1 if No, 2 if Yes
Do you think a student's ability to critically think directly impacts their potential success in your course?	1 if No, 2 if Yes
How enjoyable do you think students find your course?	1 if Detractor, 2 if Passive, 3 if Promotor
Do you think you need to give all the information to your students in order for them to learn your subject?	1 if No, 2 if Yes
Faculty training	
Would you be willing to attend faculty development training opportunities on critical thinking?	1 if No, 2 if Yes
What format would you prefer for faculty training activities on critical thinking?	1 if Face-to-Face, 2 if Online Asynchronous, 3 if Online Synchronous
Would you be willing to take a formal critical thinking assessment (data would be anonymized)?	1 if No, 2 if Yes

Note. *CAHS – College of Allied Health Sciences.

Copyrights

Copyright for this article is retained by the author, with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/4.0/).