An Evaluation of Critical Reflective Thinking Instruction and Assessment in a General Education Course

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Abstract
Critical reflective thinking has been conceptualised as a means to apply "reflective judgment" in the application of knowledge and information (Dwyer et al., 2014) to understand complex situations (Korucu Kis & Kartal, 2019). While regarded to be an essential skill (Tsui, 2002), it has been posited as a difficult skill to teach in first-year higher education courses (Procter, 2020). This study aimed to examine the effectiveness of strategies employed in both lectures and tutorials to facilitate critical reflective thinking in a first-year general education course in Singapore. Students' views on teaching methods and assessments were gathered through two anonymous feedback administered mid- (n=59) and at the end of the course (n=40). Two independent researchers thematically coded these responses according to the integrated critical thinking framework by Dwyer and colleagues (Dwyer et al., 2014), and reflected on the methods of teaching and assessing critical reflective thinking in the present paper. Through this discussion, we suggest that student feedback could play an important role in informing both the instruction and assessment of critical reflective thinking in a higher education setting. We leveraged on existing literature to provide recommendations to circumvent the barriers to critical reflective thinking raised by the students. This paper seeks to contribute towards bridging the divide between the expectations of students and those of teaching faculty (Schilling & Schilling, 1999) in the teaching and assessment of critical reflective thinking.

1 Introduction

Drawing on Dewey's definition of critical thinking as "an active, persistent, and careful consideration of a belief or supposed form of knowledge…and the further conclusions to which that knowledge leads" (Dewey, 1933), as well as the idea of reflective thinking as a process of stepping back and thinking before making judgments to prevent reaching hasty conclusions without examining all possibilities (Kember et al., 2000), critical reflective thinking has been conceptualised as a means to apply "reflective judgment"

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in the application of knowledge and information (Dwyer et al., 2014) to understand complex situations (Korucu Kis & Kartal, 2019). The metacognitive process of critical reflective thinking allows one to better achieve "a logical conclusion to an argument or solution to a problem" by employing various skills such as analysis, evaluation and inference to make a "purposeful, reflective judgement" (Dwyer et al., 2014). Critical reflective thinking therefore allows an individual to focus on and understand relevant and important information, analyse the credibility of which, and be cognisant of one's biases to make a logical, informed decision.

Critical reflective thinking has been rendered as a pertinent and indispensable skill in the 21st century as it equips individuals with the ability to problem-solve, be it in their personal or professional lives, as well as in their duty as responsible citizens (Tsui, 2002). It has also become a cornerstone in higher education curriculum, pedagogy, and policy. These skills would allow students to become effective members at their workplace upon graduation, preparing them to make important decisions and solve problems (Snyder & Snyder, 2008). Yet simultaneously, the challenges to teaching critical (reflective) thinking in higher education have been raised at length (Brookfield, 2011; Johnson, 1992; Tsui, 2002; Wendland et al., 2015). In this regard, it is argued that critical reflective thinking has been posited as a difficult skill to teach in higher education classes, especially in first-year courses, because students could lack confidence and proficiency in their ability to think beyond information and concepts delivered to them in class (Procter, 2020).

This paper evaluates the methods of teaching and assessing critical reflective thinking in a Singapore Studies course (hereafter referred simply as "course") offered by the National University of Singapore (NUS) Saw Swee Hock School of Public Health. For context, NUS is one of the leading universities regionally and globally, positioned third among Asia's universities by Times Higher Education (The Straits Times, 2021). NUS offers undergraduates the General Education (GE) curriculum, aimed at nurturing students to not only become experts in their field but also active members of the society. Singapore Studies is one of the pillars of the GE curriculum, focusing on developing critical awareness about present-day and future issues in the Singapore society, and an understanding about the Singapore context and Singapore's position in the region and the world. The GE curriculum at NUS requires all undergraduate students to select one chosen module from six different pillars, of which "Singapore Studies" is a core pillar. "Singapore Studies" courses offered in NUS are unique from other GE courses given their sustained focus on Singapore's development and national concerns. Singapore Studies courses are by nature interdisciplinary, informed by a variety of disciplines such as public health, the environment, infrastructure, transportation and resource management, technology, and the economy and industry.

The present course is centred on the evolution of public health challenges in the Singapore context and provides students with a broad survey of Singapore's public health issues since the post-colonial period, situated within the socio-historical context of nation-building. Throughout this course, students are required to reflect on how and why different public health challenges have evolved through the ages and think critically about how the nation can deal with both present and future health threats. Through an exploration of issues ranging from sanitation and hygiene to pandemic preparedness and health promotion, the topics covered in the course syllabus are meant to facilitate a deep awareness of the centrality of public health management within Singapore's national development project. To scaffold students' learning in achieving the desired learning outcomes, this course emphasises "critical reflective thinking" – a pedagogical strategy which will be explored.

Through qualitative analysis, the methods of teaching and assessing critical reflective thinking the course is evaluated. The authors examined the effectiveness of strategies employed in both lectures and tutorials to facilitate critical reflective thinking through an analysis of students' views using a qualitative research approach. Students' attitudes towards course assignments are discussed thematically with reference to Dwyer and colleagues' integrative framework of critical thinking (Dwyer et al., 2014). Several recommendations based on the reflection of the qualitative findings are presented. This paper

exemplifies the importance of student feedback in informing both the instruction and assessment of critical reflective thinking in interdisciplinary settings in higher education. It is hoped that the findings could assist in dovetailing the expectations of students and that of teaching faculty (Schilling & Schilling, 1999) in the teaching and assessment of critical reflective thinking across the disciplines.

2 Methods

2.1 Course instruction and assessment

The instructional methods and assessments in this course draw heavily on Dwyer, Hogan and Stewart's integrated critical thinking framework (Dwyer et al., 2014) (Figure 1). According to this framework, skills required to think critically include analysis, evaluation, and inference. These contribute to their ability to employ reflective judgement (i.e. "an individuals' understanding of the nature, limits, and certainty of knowing and how this can affect how they defend their judgements and reasoning, especially in contexts where ill-structured problems are encountered") (Dwyer et al., 2014) by building upon memory, knowledge and comprehension. The entire cognitive process is influenced by the students' self-regulatory functions of their metacognition, which directly mediates their ability to perform the skills required to conduct critical reflective thinking. This includes aspects such as their disposition (i.e. inclination) and motivation (i.e. self-regulation) towards critical reflective thinking.

Figure 1

Adoption of the Integrative Framework of Critical Thinking (Dwyer et al., 2014) in the Present Course's Teaching Approaches and Assessment Methods
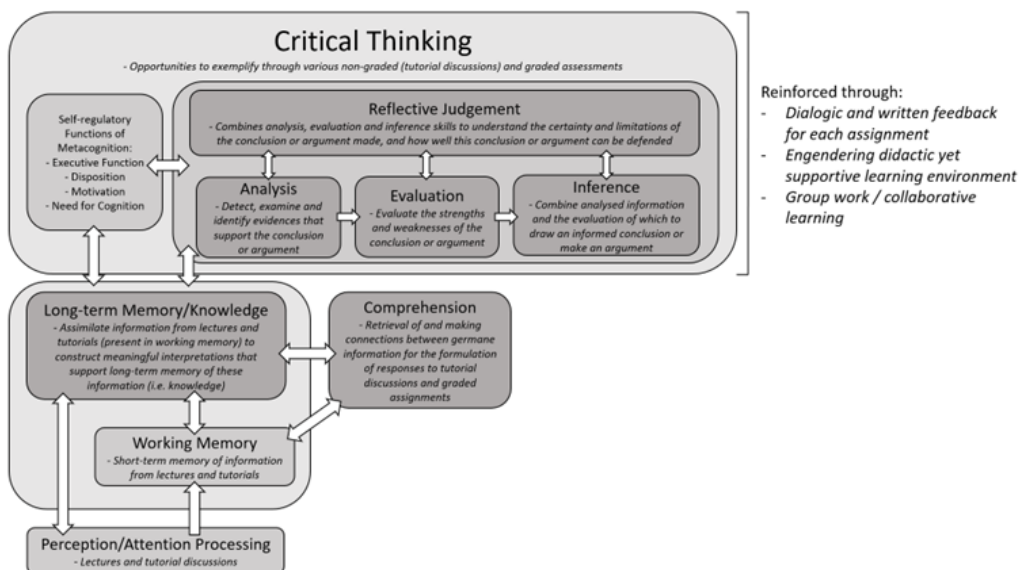
2.1.1 Teaching approaches

Structurally, this course adopts a lecture-tutorial approach. The lectures, tutorials, and graded assessments synergise the plethora of approaches presented in literature for fostering critical reflective thinking in an educational environment. Summarily, the lectures in this course serve the purpose of grounding an understanding of public health in Singapore through teacher-led transmission of key concepts and theories. Lectures are an important component of this course as they serve as building blocks that will subsequently equip students with prior knowledge to process and assimilate these

information in their working memory to form meaningful interpretations that they will remember in the long term (Dwyer et al., 2014).

Tutorials offer opportunities for students to integrate information they have gathered from the lectures, as well as that of germane resources to arrive at a conclusion or make an argument. Tutorial sessions are held in smaller groups of approximately 25 students, and tutors guide students to critically reflect on various issues pertaining to the local public health landscape through class discussions, debates, and sharing. Topics discussed in tutorials include definitions of citizenship; health promotion through different historical periods; and citizen autonomy amid the evolution of health policies, just to name a few. These topics are presented as open-ended questions that are reiterated to have no "right" or "wrong" answers. An example of an open-ended question posed for discussion is "Managing public health challenges in Singapore is often beyond the control of the state. Do you agree?". Such open-ended questions require students to comprehend the resources that support their argument and actively engage in critical reflective thinking, as well as reasoning processes. Further, in order to make a reflective judgement on whether their conclusion or argument is adequately substantiated and can be defended, they are required to analyse the information they had to propose a conclusion or argument, evaluate the strengths and weaknesses of their argument and finally, make inferences on whether their conclusion or argument is valid (Dwyer et al., 2014). While students' responses in tutorials are not graded, they will receive individual feedback after each session to help them ruminate the public health issues presented more deeply and are guided on how to formulate their arguments and claims in the graded assignments. These tutorials engender a didactic yet supportive learning environment; students are encouraged to evaluate and comment on their peers' work, offering different perspectives and facilitating collaborative learning. These complement the dialogic feedback from tutors to provide critical and reflective thinking-centric scaffolding and guidance (Abrami et al., 2015; Teo, 2019). Relating to the integrative framework of critical thinking in Figure 1, these discussions help to train students' attention processing, build their knowledge on the subject matter, and guide students on how to better make reflective judgements by getting students to explain their analyses, evaluations, and inferences made that led to their conclusion or argument. Group discussions further provide opportunities for collaborative learning and problem-solving by getting students to conduct research, present their ideas and gain different perspectives from their peers (Dimmitt, 2017; Snyder & Snyder, 2008). Collectively, these serve to hone their ability to think, analyse, and reflect on a multitude of contemporary public health issues in Singapore.

2.1.2 Formative and summative assessments

To assess students' abilities to think critically and reflectively, they are required to complete two key assignments: (1) a formative group assignment comprising a graphic organiser that illustrates the development and management of an assigned public health issue in Singapore, and (2) a summative individual assignment that is an argumentative essay requiring the construction and defence of an argument in response to an open-ended question.

The formative assignment (creating a graphic organiser) assesses students' abilities to make connections between different facets of Singapore's public health landscape, including contexts, historical significance, stakeholders, roles of citizens and the state; select and integrate relevant and significant evidence and data related to a chosen public health issue; analyse and depict the real-life challenge in Singapore's public health landscape using the macro-concept of 'system'; and communicate and present their ideas clearly, logically and creatively with the use of a suitable graphical design.

The summative assignment (an argumentative essay of 1500 words) provokes students to critically examine whether Singapore has been successful in the promotion of healthy lifestyles over the past 20 years. They are assessed based on their ability to construct well-reasoned arguments based on the

content, ideas, and themes covered in the course; substantiate their responses using evidence from course readings and external references; and formulate a balanced analysis of the given issue and conclude using an appropriate and original method of evaluation. This assignment allows students to individually demonstrate their knowledge and skills acquired throughout the course – their understanding of the public health landscape in Singapore, their ability to conduct thorough research, and more importantly their ability to synthesise evidence and examples to form a compelling argument (critical thinking component), while simultaneously assessing and recognising the strengths and limitations of their conclusion (reflective thinking component). Demonstration of these would be tantamount to demonstrating critical reflective thinking (Bezanilla et al., 2019).

Like the group discussions held during tutorial discussions which would have served as practice, these graded assignments go beyond requiring students to superficially restate learnt information. Students are required to demonstrate that they have acquired relevant information, and reflect critically on the themes covered in the course syllabus in order to create their own connections between ideas and construct original and well-substantiated arguments (Lai, 2011). Their responses are assessed based on how well they could substantiate their argument, whether they considered and reflected upon evidences that contradicted their viewpoints that could have weakened their argument, and overall how compelling their arguments are, indicative of their ability to exercise reflective judgement in their critical thinking (Dwyer et al., 2014). A well-balanced answer that would be awarded a higher grade would be one that clearly demonstrated various components of the integrative framework of critical thinking, namely knowledge and comprehension of the subject matter, sound analyses and evaluation of evidence, and valid inferences that supported their conclusion or argument in a well-reasoned manner (Dwyer et al., 2014).

2.2 Study design and data collection

A qualitative study design was adopted to examine the students' views on instruction and assessment with regards to critical reflective thinking across two semesters (n=95 students). The students provided their feedback on the course through an anonymised mid-course (n=59, 62% response rate) and end-of-course (n=40, 42% response rate) open-ended online survey administered by the NUS School of Public Health, and the NUS student feedback system respectively. They were required to reflect on the instructional and assessment methods during the course, and whether and how these aspects contributed as facilitators and barriers to honing their critical reflective thinking in the module. As both surveys were anonymised (i.e. no identifiers were collected), we were regrettably unable to link mid-course and end-of-course survey responses to observe any changes in perception between the two time points and thus, responses from both time points were analysed collectively.

2.3 Data analysis

These responses were exported from the respective survey platforms and the qualitative data were analysed according to an established and well-used thematic analysis guide by Braun and Clarke (Braun & Clarke, 2006). The responses were first read by the researchers to gain an overall understanding of the perceptions of the students. These responses were then thematically coded using themes guided by Dwyer and colleagues' integrated critical thinking framework (Dwyer et al., 2014) using the theoretical thematic approach (Braun & Clarke, 2006). This analytical approach organised the students' feedback responses on the teaching methods, modes of assessment, as well as difficulties they faced into meaningful and interpretable themes centred on critical reflective thinking in instruction and assessment.

3 Results

3.1 Appreciation and grasp of critical reflective thinking

Based on their responses, several students described the course as "interesting", "insightful" or "engaging" (n = 14). They felt that the teaching and learning methods piqued their curiosity, and this is understood through feedback such as "*eye-opening*", "*provides areas to think about*", "*I have learnt a lot…find them very enriching*", "*…gives me more insight…and stimulates my learning*". Feedback also pointed towards the fact that the lectures and tutorial activities, overall, have helped them to think deeply and critically about various public health issues -"*…made me think deeper about certain public health challenges*". Through these activities, it can be extrapolated that students have generally gained a better understanding of the topics - "*…helped me understand the different topics in public health*", "*tutorial sessions…[allowed] me to learn more things outside of the scope of the lecture notes*" - and were able to synthesise knowledge from the various lecture and tutorial sessions to gain a better understanding of the subject matter -"*learnt a lot about the different public health issues in Singapore and it has broaden my perspective (sic) on how to view the issues holistically*". These helped to reinforce their learning -"*Tutor is incredibly helpful in clarifying material and reinforcing our learning*", "*…helped me better understand how to apply what I have learnt*" - which go to show that the embeddedness of critical reflective thinking in teaching and assessment have facilitated the achievement of the learning outcomes of the course.

3.2 Challenges and difficulties

The student feedback was also useful in shedding light on various difficulties faced in demonstrating critical reflective thinking, especially through their assignments. Responses were categorised into themes and grouped based on the elements (i.e. "Knowledge and comprehension", "Self-regulatory functions of metacognition" and "Critical thinking") of the integrative framework of critical thinking by Dwyer and colleagues (Dwyer et al., 2014) where applicable.

3.2.1 Knowledge and comprehension

Some students indicated that they preferred more scaffolding and guidance as they faced difficulty in "*working without guidance*". Although the assignments were formulated to assess the students' abilities to demonstrate independence in seeking scientific references, evidence, and examples to substantiate their argument, several of them expected information to be made available to facilitate their assignments, and some have claimed that they have "*not [been] given enough related information for the writing assignments*". While others felt that information and content knowledge was sufficient, these students expressed difficulty in translating information on public health issues to substantiate their arguments, which can be inferred from comments such as "*Lack of linkage between thoughts and opinions with the information*" and "*[difficulty in] linking the concepts together*". Referring to Figure 1, these responses highlight a gap between students' ability to comprehend information and them making analyses and evaluation of which to support their conclusion or argument, impeding their overall ability to make reflective judgement pertinent for critical thinking. This signals for greater support needed to facilitate critical reflective thinking, beyond that performed in the present course (i.e. individualised feedback, optimised learning environment, collaborative learning, etc.).

3.2.2 Self-regulatory functions of metacognition

Disposition – We observed some inherent biases students held in regard to demonstrating critical reflective

thinking, such as students having the preconceived notion that students from arts-oriented disciplines had an advantage compared to those from science, technology, engineering and mathematics (STEM) backgrounds, as the former students would be more adept at writing essays -- "*It is not natural for STEM students to be taking a definite stand in an argument…*"; "*…playing field is not even for students…*". Likewise, another student commented that the course concentrated heavily on essay-writing, and that it "*made it very difficult for students who are better at problem–solving as compared to students who were naturally good and talented in expressing their thoughts in essay writing. Thus, those who were good in debate had an advantage*". Such perceptions undermine the transdisciplinary nature of critical thinking skills, wherein the students' negative disposition towards critical thinking (and critical thinking tasks) would influence their inclination to perform the skill. We also observed that while group discussions and the group project were intended to facilitate critical reflective thinking through collaborative learning, few felt that it was beneficial, and some shared that there was "*too much groupwork*" and that they had trouble working with their randomly assigned group members –"*[difficulty in] getting my group members to be proactive and contribute*", "*differing ideas and expectations with group mates*", "*I would much rather do things by myself*". Having to manage members of the group provides a platform for students to problem-solve, a skill that requires critical evaluation of the situation, and having opposing viewpoints within the group creates opportunities for students to further analyse and evaluate their conclusion or argument. Instead of transforming the situation to into learning opportunities to develop their critical thinking skills, the students who saw these as an impediment to their task may have had a negative disposition towards group work, obfuscating their inclination towards thinking critically.

Motivation – A number of students generally shared that they struggled to articulate their thoughts ("*[difficulty in] understanding the content and how to incorporate it into words when sharing…*") and felt anxious about having to present in front of their peers -- "*I tend to panic when I have to answer questions on the spot as I am a bit shy*". The dialogical feedback also made some students feel inadequate ("*the professor kept pointing out the points we could learn on, which reduces the self-esteem of the students to speak up…*"). The lack of confidence may affect their motivation to engage in discussions during tutorials and thus, they would not benefit from the discussions as they would not receive feedback on how they could think more critically and reflectively.

3.2.3 Critical reflective thinking

While the concept of "critical reflective thinking" was introduced at the beginning of the course, the students shared that they did not know how to think critically. It was mentioned that "*Lectures mostly just providing content, not much about critical thinking...*" and that there was "*too many (sic) critical thinking needed*".

In terms of the application of critical reflective thinking in their analysis and evaluation of examples required in class discussions and assignments, some students shared that they struggled with getting started on the assignment: "*I don't know how to start when thinking about the issues*"; "*Not sure how I should approach the questions given*"; "*[difficulty in] coming up with a cogent plan of action for the assignments before starting to do them*"). Others felt it was "unnatural" or challenging to argue a stand –"*conclude definitively doesn't sound too virtuous*".

Like the point raised earlier (Section 4.2.1), this feedback demonstrate the need to address the gap between knowledge and the making of a confident argument or conclusion, by strengthening the students' analytical, evaluative and inferential skills beyond instruction and feedback from the tutors.

3.2.4 Contextual barriers to critical reflective thinking

While not implicitly elaborated in the integrative framework of critical thinking (Dwyer et al., 2014),

contextual factors such as the environment and instructor support play an imperative and facilitative role in students' ability to express their viewpoints, one in which they can practice and hone their ability to think critically and reflectively. In this regard, students expressed that dismissive attitude of the tutors negatively influenced their inclination towards speaking up in class to express their viewpoints ("*the professor kept pointing out the points we could learn on, which reduces the self-esteem of the students to speak up…*"), and suggested for the tutor to provide general feedback to the tutorial group, rather than targeted feedback to each student in the presence of their peers. In contrast to these experiences, when the tutor affirmed their efforts, they felt more comfortable and compelled to engage in the tutorial discussions actively ("*In group presentations or individual sharings, saying things like 'Thank you for sharing' helps me feel better…I feel understood…my tutorial facilitator did this and it helped me to enjoy and learn better*"). These comments highlight that beyond approaches directly related to critical reflective thinking, educators should also focus on providing a conducive setting that allows for students to engage in classroom activities such as discussions to hone their critical reflective thinking.

4 Suggestions for Better Integration of Critical Reflective Thinking in Instruction and Assessment

Our findings were encouraging in that students, based on their feedback, seemed to have recognised, appreciated, and seen merit in the embeddedness of the critical reflective thinking framework in this course, albeit the barriers they faced in demonstrating so which required more support to overcome. Using the integrative framework of critical thinking as a structure (Dwyer et al., 2014), we draw on the student feedback presented above to make the following recommendations for enhancing critical reflective thinking among undergraduate students in Singapore, with a specific focus on general education courses. It is worth noting that critical thinking (and the promotion of which) is culture-specific (Tan, 2017), hence our suggestions pertain to Singapore's higher education context.

4.1 Addressing barriers related to knowledge and comprehension

Even at the undergraduate level, it may be presumptuous to assume that students are able to grasp the requirements of assignments, especially where critical reflective thinking is a requisite skill (both implicitly and explicitly). While lectures introduced key public health issues, students were instructed to make effective use of evidence from these course materials, as well as external references when completing their assignments. Despite these instructions, they relied heavily on course materials, giving rise to sentiments that there were "*not given enough related information for the writing assignments*" and thus impeded their ability to demonstrate significant dispositions associated with critical reflective thinking.

While responses like the above were few and may not represent *all* students of the course, instructors should make note that not all students at undergraduate level are equally independent in their learning. In this course, instructors are available for clarifications regarding the assignments. Furthermore, the assessment rubrics for each assignment were made available in the assignment instructions, which could have served as a guide for students on the requirements for attaining specific grades. While it may seem intuitive and oftentimes regarded as 'standard practice', our findings reiterate the importance of reminding students to refer to information provided to guide them on their assignments, and that they may contact their tutors should they require clarification on the assignment instructions. It was also made clear the need to set the expectation from the beginning of the course that students, especially at undergraduate level, should exercise a certain degree of independence in their learning. Content

provided in the course was non-exhaustive, and assignments required students to conduct a review of literature to support their arguments. Since part of exhibiting critical reflective thinking includes analysing and evaluating evidences to make inferences on the validity of one's argument (Dwyer et al., 2014), we recommend for these expectations to be communicated clearly to the students, ideally at the beginning of the course, such that they may hone their ability to independently seek evidence such as examples, case studies and scientific references. This would in turn effectively cultivate their critical reflective thinking skills.

4.2 Aligning students' disposition and motivation towards critical reflective thinking tasks

Dewey has expressed the significance of personal attributes in critical thinking in the statement "If we were compelled to make a choice between these personal attributes and knowledge…we should decide for the former" (Dewey, 1933). This was also reflected in Dwyer and colleagues' work, where disposition was highlighted as one of the metacognitive skills required for critical reflective thinking (Dwyer et al., 2014). As part of this study, there were two important aspects that were identified based on the students' survey vis-à-vis their disposition towards critical reflective thinking tasks in the present module. Firstly, some had the preconceived notion that students of certain backgrounds were disadvantaged compared to others as they were not "accustomed to writing", and secondly, some had negative perceptions of the group work and "would much rather do things [themselves]".

Writing (essays) has been demonstrated to be one of the most effective methods to develop critical thinking (Tsui, 2002). These tasks stimulate students to think deeply about their stance and hone their ability to synthesise and analyse evidence to refine their conclusion or argument. This nudges students to go beyond understanding content, to reflect on the evidence presented, and evaluate and make inferences from information to derive a conclusion or make an informed argument. However, the sentiment extrapolated from the student responses in this study was that students of STEM backgrounds felt disadvantaged in writing assignments as a means to appraise critical reflective thinking, as compared to their counterparts from the arts and humanities background (e.g. social sciences and humanities). This is not new information; in fact, in the case study presented by Tsui (2002), different institutes may place varying curricular emphasis on writing, wherein the social sciences and humanities curriculum may entail more writing compared to others (e.g. STEM). To address these discipline-specific views towards writing assignments and critical reflective thinking, it is important for instructors to communicate with or demonstrate to the students that these skills transcend disciplines and will allow them to be more critical in their work, regardless of their background (Forbes, 2018; Halpern, 1998). This may aid in aligning the students' mindsets towards writing tasks, allowing them rise above seeing writing assignments as a setback on their grades due to their perceivably disadvantageous background. With that, students may better appreciate the merits of engaging in written work for fostering critical reflective thinking skills necessary for all disciplines, developing their disposition to applying these skills not just in the present course, but also in their field (Halpern, 1998).

As mentioned earlier, collaborative learning and problem-solving (in the form of group work and tutorial discussions) provide opportunities for students to think, analyse, and reflect on the subject matter. While students shared that they faced difficulties engaging their group members and would rather do things themselves, having to deal with challenges when working in a group such as accommodating different working styles and personalities, delegating tasks, and dealing with disengaged group members are part and parcel of the learning journey that prepares undergraduates for the challenges of workplaces. However, first-year students may lack knowledge and experience in working in a group, which could have resulted in their negative group work experiences (Drury et al., 2003). Although negative feedback regarding group work in present study were few and only came up at the mid-course survey (i.e. none at the end-of-course survey), it may be important to introduce the objectives of group work at the beginning

of the module to help students align with the tutor's expectations for such tasks. Like the point above, communicating objectives and the trans-disciplinary nature of soft skills like critical reflective thinking and teamwork could improve the disposition of students towards tasks. Encouraging them to transform intra-group differences such as divergent working styles or opinions could allow the students to take advantage of such situations to problem-solve and approach opposing viewpoints within the group as opportunities for them to further analyse and evaluate their conclusion or argument, honing their critical reflective thinking skills in turn.

4.3 Enhancing students' analytical, evaluation and inference skills to facilitate critical reflective thinking

The students shared that they faced difficulties linking what they have learnt to support their argument and that they needed more guidance on how to incorporate analysis, evaluation, and inference to inform their reflective judgement process. Based on their feedback, they advocated for more scaffolding and guidance on how to analyse the evidence acquired to substantiate their argument (i.e. "getting started on the assignment"), and how to evaluate their argument to ensure that they have confidently and convincingly defended their argument in their response (Dwyer et al., 2014).

Brown and Keeley have provided sample questions to engage students and facilitate their inquiry, such as "What do you think about this?", "Why do you think that?", "What does it imply and presuppose?" and "What explains it, connects to it, leads from it?" (Browne & Keeley, 1986; Snyder & Snyder, 2008). Asking such questions (or providing such guiding questions in assignments) could guide and facilitate students to introspect their viewpoints, thereby guiding them in analysing, evaluating, and drawing inferences from their resources to form and evaluate their argument (Brookfield, 2011).

These questions could also facilitate students to engage in reflective thinking (or reflective judgement), which "involves a transformation of beliefs, attitudes, opinion, and emotional reactions that comprise meaning schemes or transforming meaning perspectives" (Lucas & Tan, 2006). To think reflectively is to "to take a stand…and to develop your own voice"; to go beyond developing a critical outlook or perspective on matters, but also challenge one's committed beliefs upon reflecting on new evidence or information (Lucas & Tan, 2006). Researchers have suggested encouraging students to seek and use information sources that pose viewpoints that differ from the students' own (Whitmire, 2004). More recently, a structured approach in the form of a reflection pyramid was developed to guide students to delve deeper into issues presented by first considering the opposing viewpoint (i.e. summarising and critiquing a variety of sources), identifying what they learnt from it (i.e. to be perceptive of the world around them/be critical of the information they receive) and finally, reflecting on how these information have changed the way they think or what these information mean to them (i.e. demonstrate critical self-evaluation/be critical of the information they receive/relate what they learn to new contexts/discuss and evaluate opposing viewpoints) (Power, 2016). Educators could encourage students to challenge their preconceived notions by exploring opposing viewpoints and guide them in reflecting on the credibility of these sources of information and how these may have changed their outlook or perspectives of relevant issues. These would help students identify the strengths and weaknesses of their conclusion or argument, and objectively assess the validity of which. These recommendations directly address the "evaluation" and "inference" components of Dwyer and colleagues' integrated framework to contribute to the making of a reflective judgement (Dwyer et al., 2014), and may benefit tutors guiding undergraduate students who may have little to no experience in thinking critically and reflectively.

Finally, based on the responses, some students shared that they did not know how to apply critical reflective thinking when attempting the assignments ("*I don't know how to start when thinking about the issues*"; "*Not sure how I should approach the questions given*"). At the undergraduate level, students

may not have acquired sufficient experience to think critically, and may not fully understand or know how to do so (Snyder & Snyder, 2008), which was also reflected in the responses we gathered. Modelling is as a means for educators to demonstrate such skills, by posing open-ended questions that have no definite right or wrong answers and providing structure and feedback to guide students in their cognitive process (Brookfield, 2011; Snyder & Snyder, 2008). While this was applied in the tutorial sessions on a fortnightly basis in the present course, the weekly lecture-based sessions emphasised content-sharing and may not have provided students with adequate opportunities to exhibit critical reflective thinking and to receive feedback on their viewpoints. We recommend that instructors model critical reflective thinking in their lessons, regardless of lecture- or tutorial-based sessions. Posing guided questions, stimulating the students' thinking with appropriate follow-up questions, and providing feedback and encouraging students to inquire more deeply about the subject matter (Snyder & Snyder, 2008) on a regular basis could set an example and reinforce how and what it means to analyse, evaluate, and draw an inference (Dwyer et al., 2014), and provide students with the confidence to formulate critical and reflective viewpoints. These need not always take the form of essay-based questions, which could be tedious for students to complete and time-consuming for the instructors to mark and provide feedback on. Liu and Roohr have suggested that critical thinking assessments could also take the form of creating or filling out a table, producing a diagram that analyses or evaluates the material provided, or making a short constructed response, to name a few (Liu et al., 2014). These could be utilised as introductory assignments to prepare them for essay-writing, wherein breaking up the critical reflective thinking task into sections that guide them along could incrementally build their confidence in thinking critically and reflectively.

4.4 Building an inclusive and reinforcing culture of critical reflective thinking

Culturally, students in Singapore have viewed teachers as authoritative content experts and themselves as passive learners (Tan, 2017), wherein this perceived hierarchy may be an impediment to speaking up. This was mirrored in the responses gathered in our survey, where students had qualms expressing themselves in the presence of their peers or tutors, which may diminish their motivation to express their viewpoints confidently. Although the group presentations were a collegial approach to alleviate students' anxiety when presenting their viewpoints or arguments (as opposed to them sharing their responses individually), their responses shed light that the tutor's responses also played a pivotal role in facilitating their learning. Aptly put by Patel, "what they (students) learn and how they make sense of knowledge depends on the social context in which they learn" (Patel, 2021). The social context of learning is one in which educators play a paramount role in creating. Affirming and validating students who speak up and providing general rather than targeted feedback could better engender a safe, supportive, and non-judgemental learning environment, one in which students could express their viewpoints freely without contempt, seizing opportunities within the course to demonstrate and hone their ability to think critically and reflectively. In the feedback we gathered, one student shared that he/she was able to enjoy and engage in the tutorial sessions better when the tutor reaffirmed the students by saying "*Thank you for sharing*". Academics have coined the term "micro-affirmations", defined as acts that gesture inclusivity, care, listening, and giving credit (Rowe, 2008). Within the higher education environment, micro-affirmations would allow students to feel "welcome, visible, and capable of performing well" (Powell et al., 2013). Practicing micro-affirmations frequently, intentionally, and appropriately could therefore facilitate student engagement and improve the learning outcomes of the undergraduate students. Helping students feel more confident in engaging in class discussions would allow them to take advantage of these discussions and receive feedback on how they could think more critically and reflectively.

Additionally and upon introspection, instructors may tend to break the silence after a question is posed by re-wording or paraphrasing the question to encourage student engagement (Snyder & Snyder, 2008). In retrospect, this may have also been the case in the present course, in which tutors feared

the "awkward silence" and tended to simplify questions or break the discussion topic into smaller components to facilitate students in sharing their responses. Albeit out of good intentions, it was found that particularly for cognitive tasks such as critical reflective thinking, more time is required for (inexperienced) students to construct their response (Schafersman, 1991). Rushing students without giving them ample time and space may negatively influence their disposition to think critically as they may simply "give up". To engender a supportive learning environment, we recommend instructors to be patient and provide time and space for students to come up with their original viewpoints or arguments instead of hastening a response. This way, the students can reflect more deeply on the subject matter, analyse and evaluate the information they have, and formulate a critical response without pressure, reinforcing a culture of thinking critically and reflectively in an independent manner.

5 Strengths and Limitations of the Study

The present study examined the barriers to critical reflective thinking experienced by first-year undergraduate students of a public health-related module. We conducted thematic analysis to categorise these barriers in accordance with Dwyer and colleagues' integrated framework. Through which, we made streamlined, specific, and relevant suggestions to improve instruction and assessments aiming to engender critical reflective thinking in undergraduate students. However, we acknowledge several limitations of the present study. Most pertinently, due to the nature in which responses from students were collected, we were not able to match mid- and end-of-course responses to examine if students' perspectives shifted over time. Responses were also collected through a survey, as opposed to interviews or focus group discussions conducted in most qualitative studies, which limited information gathering. Future studies should consider a longitudinal mixed methods study design to better understand the pathways in which barriers to critical reflective thinking influence the students' ability to demonstrate the skill in their undergraduate assignments.

6 Conclusion

Teaching critical reflective thinking in the higher education context can be challenging. In this paper, we reflected on and appraised the assessment of critical reflective thinking through course assignments based on students' attitudes towards these tasks. This study sheds light on the idea that student feedback could play an important role in informing both the instruction and assessment of critical reflective thinking in interdisciplinary settings in higher education. Based on the students' feedback, we have proposed several strategies relevant in the Singapore higher education context for fostering critical reflective thinking. These include giving explicit instructions and encouraging independent learning; aligning students' attitude or disposition towards tasks; building an inclusive and reinforcing a culture of critical reflective thinking; and enhancing students' analytical, evaluation and inference skills to facilitate critical reflective thinking. These ideas could ultimately contribute towards bridging the divide between the expectations of students and that of teaching faculty in the teaching and assessment of critical reflective thinking across the disciplines.

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