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Assessing critical thinking in business education: key issues and practical solutions

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Abstract:	Developing critical thinking is an important goal in higher education and, more importantly, in business education. Yet, it is uncertain to what extent assessment influences students' critical thinking development and enhancement. This paper presents data from a study that applied a framework we developed to identify evidence of students' ability to think critically and whether students face challenges at applying critical thinking. A sample of 100, 2000-word group reports from a masters business analysis subject were evaluated using a critical thinking assessment rubric. We followed this with a content analysis of 49 reports using our developed framework to identify the demonstration of critical thinking dispositions and abilities. The findings from both analyses indicate a difference between student reports on how critical thinking is demonstrated. Most importantly, our developed framework provides a novel way to analyse student reports that inform whether they demonstrate the specific components of critical thinking dispositions and abilities. The evaluation using our established framework enables us to offer practical suggestions that university instructors can use to address the issues and challenges raised that hinder critical thinking acquisition via assessment practice in business education.
Response to Reviewers:	

Response to Reviewers' Comments

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Assessing critical thinking in business education: key issues and practical solutions

Editor-In-Chief

Dear Dr Calma,

Thank you for submitting your manuscript to The International Journal of Management Education.

I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following minor revision and modification. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by Jul 21, 2021.
…

Response:

Thank you for sending the reviewers' comments and your invitation to resubmit. We have carefully reviewed the comments and have revised the paper accordingly. The feedback is useful in improving our paper. We have noted and addressed all the comments from the reviewers below. We hope that the revised manuscript meets the standard required by TIJME and our response satisfies the reviewers.

The Authors

Highlights

Assessing critical thinking in business education: key issues and practical solutions

1. A newly developed framework for evaluating students's acquisiton of critical thinking is used in the study and focusses on four dimensions.
2. Assessed student reports lack evidence of critical thinking based on the four dimensions.
3. Four recommendations are proposed for management educators to assist students to develop critical thinking.
4. Application examples are provided across 12 critical thinking dispositions and 15 critical thinking abilities.
5. Practical suggestions are offered for management educators such as teaching students to make managerial decisions and modelling the critical thinking process.

Assessing critical thinking in business education: key issues and practical solutions

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Assessing critical thinking in business education: key issues and practical solutions

Developing critical thinking is an important goal in higher education and, more importantly, in business education. Yet, it is uncertain to what extent assessment influences students' critical thinking development and enhancement. This paper presents data from a study that applied a framework we developed to identify evidence of students' ability to think critically and whether students face challenges at applying critical thinking. A sample of 100, 2000-word group reports from a masters business analysis subject were evaluated using a critical thinking assessment rubric. We followed this with a content analysis of 49 reports using our developed framework to identify the demonstration of critical thinking dispositions and abilities. The findings from both analyses indicate a difference between student reports on how critical thinking is demonstrated. Most importantly, our developed framework provides a novel way to analyse student reports that inform whether they demonstrate the specific components of critical thinking dispositions and abilities. The evaluation using our established framework enables us to offer practical suggestions that university instructors can use to address the issues and challenges raised that hinder critical thinking acquisition via assessment practice in business education.

Keywords: critical thinking; business; business education; assessment; management; management education; employability skills

1.0 Introduction

Developing university students' critical thinking is a desired outcome of higher education and is valued by employers as contributing to graduates' professional success and active citizenship (Erikson & Erikson, 2019; Penkauskiene et al., 2019). Now more than ever, future business leaders are encouraged to think more critically (Davies & Calma, 2020). Developing university students' critical thinking is not the sole responsibility of universities but is shared across other stakeholders. There are accreditation agencies,

provider registration and monitoring agencies, qualifications agencies and awarding bodies, licensing agencies and professional bodies, self-accrediting and/or awarding providers and external quality agencies (Bateman & Coles, 2013). Frameworks for qualifications (e.g., Australian Qualifications Framework, the European Qualifications Framework, the UK Quality Code for Higher Education) require desired levels of cognitive and technical skills expected at various levels of study. Discipline-specific professional bodies (e.g., Engineers Australia, The Association of International Certified Professional Accountants) also regard critical thinking as one of the most important 21st-century skills. Particularly in business education, accreditation places increased emphasis on critical thinking as an outcome such as the Association to Advance Collegiate of Schools of Business (AACSB, 2020). Although there is yet a consensus on defining critical thinking (Calma & Davies, 2020; Flores et al., 2012; Snyder & Snyder, 2008) and whether critical thinking development should be embedded in the disciplines (Jones, 2009a, 2009b), critical thinking is considered to be a high-order skill requiring active evaluation of information and ideas as opposed to the absorption of information and ideas (Bonk & Smith, 1998; Roy & Macchiette, 2005).

Against the background of the changing landscape of higher education (mass education, competition, and increased student diversity), together with the shifts in the labour market that requires employees to be flexible and lateral thinkers, measurement of learning outcomes associated with critical thinking has become paramount (Casey & Goldman, 2010; Penkauskiene et al., 2019). Current studies on critical thinking in business education (such as in accounting, economics, finance, management and marketing disciplines) are dominated by teaching strategies to develop and improve students' critical thinking (Braun, 2004; Celuch & Salma, 1999). Critical thinking is one of the most important employability skills, particularly because of the reported skill gap

in graduates (Cotronei-Baird, 2020; Flores et al., 2012). There is a consensus that university graduates should acquire employability skills from a university degree. This has been driven by various stakeholders, including government, industry and employers ("Employers Say Verbal Communication Most Important Candidate Skill," 2016; Graduate Careers Australia, 2016a, 2016b; Guthrie & Graduate Careers Australia (GCA), 2015; Jackson, 2010) and professional and accrediting bodies (Evans & Poullaos, 2012; Hancock et al., 2009). Thus, the call for more to be done to measure the development and improvement of university students' critical thinking skills has surfaced.

Despite this call, it is not yet clear to what extent the range of strategies currently integrated into assessment practice influences the development and enhancement of students' critical thinking (Wolcott et al., 2002). Assessment of critical thinking, however, is limited as mostly quantifiable measures are reported (Celuch & Salma, 1999; Sormunen & Chalupa, 1994; Wolcott et al., 2002). This refers to the use of well-established survey-based instruments such as The California Critical Thinking Skills Test (CCTST) and its companion, The California Critical Thinking Disposition Inventory (CCTDI). Others also used the Watson-Glaser Critical Thinking Appraisal (W-GCTA) as their study instrument. Less is known whether business education assessment tasks systematically and consistently assess critical thinking. As such, we believe that the specific dimensions of critical thinking relevant to business graduates entering a range of business professions should be developed via assessment practice. Assessment tasks, as argued by Boud and Soler (2016) and Boud (2013), should contribute to learning and be sustainable so that it supports learning and practice for the long term. Thus, we believe assessment should provide a valuable opportunity to learn and acquire critical thinking. However, little is known whether university assessment tasks can inform instructors whether specific dimensions of critical thinking are demonstrated in students' completed

work. We believe a critical thinking framework to evaluate assessment tasks is required in order to identify strategies to inform assessment practice. Thus, this is what we set out to do in this study.

Our study focused on applying a critical thinking framework we developed to analyse an assessable business report. The findings from this study highlight the core components of critical thinking that students can demonstrate and the core areas that they face issues and challenges with. The findings from this study add to business education assessment practice by providing a newly developed framework to evaluate whether assessment tasks contribute to critical thinking as one of the core learning outcomes of assessment. This moves the focus away from standardised testing of critical thinking skill measurement to a practical assessment tool (our framework), enabling us to offer some practical strategies that can be integrated into business education to address the issues and challenges raised.

This paper is structured as follows: We commence with a broad overview of the significance of critical thinking in business education. We then review how critical thinking is typically assessed in business education and how our study applies our developed framework to identify evidence of critical thinking that business students have developed, enhanced and/or that require acquisition and improvement. The paper then provides the context for the study, and an overview of the methods and findings. We conclude with a discussion of the main results, their implications for research and practice. To support other university instructors on using assessment to support students developing critical thinking, we provide some suggestions on how to address the issues and challenges raised to assist instructors in integrating critical thinking acquisition strategies in assessment practice.

1.1 Critical thinking in business education

Critical thinking is understood as acquired through appropriate teaching strategies, curriculum design and student engagement (Alavi et al., 1995; Snyder & Snyder, 2008; Zabit, 2010). Hence, critical thinking improvement and development has primarily focused on using specific teaching methods and techniques (Braun, 2004; Snyder & Snyder, 2008). The most popular approaches include problem-based learning activities, case studies and interactive activities such as discussion, debates and case simulations (Kennedy, 2007; Roy & Macchiette, 2005; Springer & Borthick, 2004). These approaches have been applied in teaching and learning activities that replace class time devoted to the transmissive delivery of class content (Braun, 2004; Smith, 2003) and direct instructional approaches to teaching (Bonk & Smith, 1998; Snyder & Snyder, 2008). These include case studies, applied projects, discussions, guided questioning and scaffolding (Braun, 2004). Student-centred consultative teaching styles (Bonk and Smith 1998), debates (Roy & Macchiette, 2005), consulting projects (Canziani & Tullar, 2017) and questioning techniques (Snyder & Snyder, 2008) have also been used. Teaching techniques based on real business scenarios have also significantly influenced teaching practice to instil critical thinking in students (Cloete, 2018). Others have offered student-centred experiential learning (Lamb, 2015) or active learning strategies (Borg & Stranahan, 2010).

Despite the number of strategies, the concern remains that these strategies are not always successful in developing and fostering students' critical thinking (Smith, 2003). In particular, it is unclear on the specific dimensions of critical thinking that business students should develop (Bonk & Smith, 1998). A systematic evaluation of students' assessment tasks to identify the development of specific dimensions of critical thinking is lacking.

1.2 Assessing critical thinking in business

A number of instruments have been used to measure business students' critical thinking. The California Critical Thinking Skills Test (Facione, 1990), the Halpern Critical Thinking Assessment (Butler et al., 2012) and the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1994) are three examples. Bloom's Taxonomy as a framework through which students can engage in higher-order thinking has been associated with critical thinking development (Dwyer et al., 2014; Nentl & Zietlow, 2008). Nkhoma et al. (2017) employed the revised Bloom's Taxonomy to demonstrate the incremental effect of business cases on higher-order thinking processes. Others have utilised student perception surveys to draw inferences of learning outcomes (Levant et al., 2016; Wilkin, 2017). Commenting on the experience of constructing an assessment instrument for critical thinking in a business college in the US, Peach, Mukherjee, and Hornyak (2007) acknowledged the challenges and difficulties that this task entails. For instance, a strong faculty and administrative staff commitment, arriving at a common understanding of critical thinking and associated learning outcomes and coping with financial and time constraints have posed challenges. Putting in place adequate measures for ongoing improvement based on feedback from students and instructors and external reviewers was also an issue. Despite existing instruments and studies, there has been little discussion about a widely accepted instrument to measure critical thinking in business education. The limited number of articles on evaluating students' critical thinking using specific assessment pieces also signals an under-researched area.

Thus, for this study, we focus on investigating to what extent students demonstrate critical thinking via the analysis of students' assessment tasks. In this paper, we present the data from a study that applied a framework we developed to identify evidence of

critical thinking that business students have developed, enhanced and/or that require acquisition and improvement.

To conduct the study, we set out to answer the following research questions:

(1) What evidence indicates that students have developed critical thinking via a business assessment task?

(2) What evidence indicates that students face challenges in developing critical thinking via a business assessment task?

(3) What practical recommendations can be offered to enhance students' development of critical thinking?

2.0 Methods

The data presented was derived from the analysis of 100, 2000-word student group report of a business analysis subject in Semester 1 2019. The subject is offered in a business school in a large research-intensive university in Australia. The business analysis subject is a typical core or compulsory subject in a number of business masters courses. Thus, the students enrolled in this subject belong to programs such as Master of International Business and a suite of Master of Management programs with various majors (e.g., Master of Management major in Marketing).

Appropriate ethics approval was received for this study to analyse previously collected data with regards to students' achievement of specific learning outcomes and skills. We did not gain permission to use direct quotations from the students' reports produced from the set assessment tasks under study.

There are three appendices referenced in this paper that would be helpful to draw the reader's attention for clarity and guidance. Appendix A is a list of critical thinking dispositions and abilities developed by Ennis. Appendix B is the rubric designed used by

the external evaluator and also used for accreditation purposes. Appendix C provides business application examples for each of the disposition and abilities mentioned in Appendix A.

2.1 Data, instrument and framework

2.1.1 The assessment group report

The student group report was submitted as part of an assessment task which asked students to demonstrate that they can effectively collect, review, and analyse relevant academic literature on a chosen topic related to an identified optimisation issue faced by a company of their choice. Student groups were required to identify and evaluate an optimisation problem in the selected case and put forward logical and relevant arguments of the optimisation problem identified throughout the report by reviewing and analysing the collected literature. To do so, the students were required to include a synthesis of at least ten academic articles that use linear programming to solve or optimise a problem. The reports were required to identify the strengths, weaknesses, and gaps in the literature, and relate the analysis to their chosen company's optimisation problem to determine the decision-making process, limitations and, if relevant, any suggestions for improvement.

2.1.2 Framework used in this study

Our developed framework aims to draw attention to identifying students' critical thinking acquisition via assessment tasks within management education. Our framework recognises that critical thinking is the acquisition and demonstration of a collection of dispositions and abilities in critical argumentation and judgement. Thus, in its development, we drew upon the six distinct yet interrelated dimensions outlined by Davies and Barnett (2015).

As a starting point, at the centre of our framework (Figure 1) sit the four critical thinking criteria that informed the rubric used by the external marker to assess the reports

and also used for accreditation purposes (Appendix B); that is, 1) critical evaluation of the issues; 2) development and presentation of the arguments; 3) application of theories and ideas to real-world context; and 4) synthesis of ideas, theories and/or data. Our framework links the critical thinking definition provided by the Delphi Report and the critical thinking dispositions and abilities drawn from Ennis' 2015 article to the four criteria.

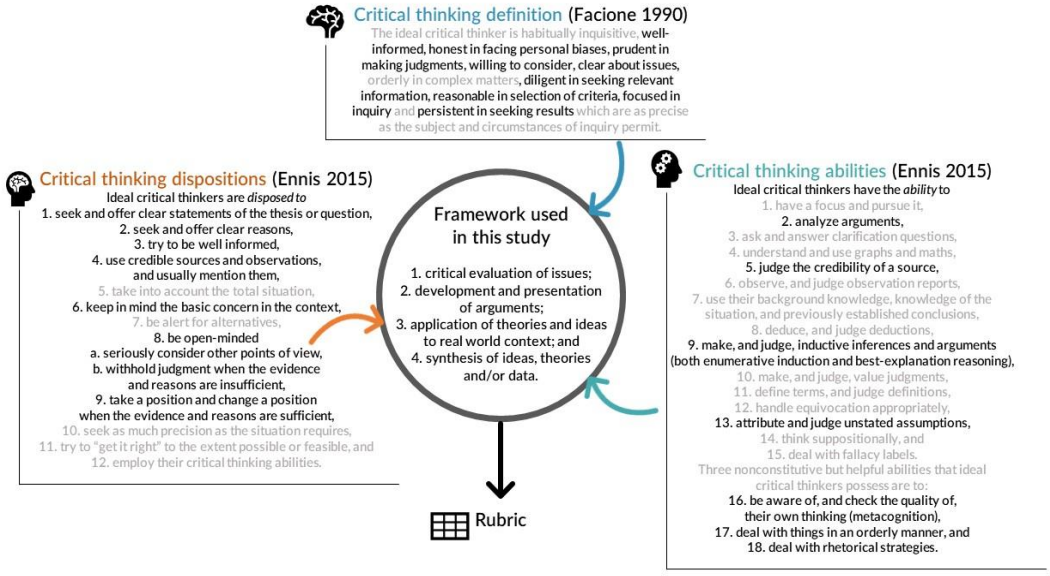

Figure 1. Critical thinking framework used in this study

Ennis offered a starting point in defining critical thinking (e.g., Ennis 1962), including taxonomies (Ennis 1985, 1987) followed by the many associated critical thinking dispositions offered (Halpern, 1998; Langer, 1989; Noddings, 1984; Paul et al., 1990). Given the lack of consensus on defining critical thinking, particularly in business or management, we focus our analysis on a widely accepted definition provided by the Delphi Report (Facione 1990, 3) which drew upon the expertise of 46 professionals from various disciplines.

> We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential conceptual, methodological, criteriological or contextual

> considerations upon which that judgment was based. Critical thinking is essential as a tool of inquiry. Critical thinking is a pervasive and self-rectifying, human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, honest in facing personal biases, prudent in making judgments, willing to consider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in selection of criteria, focused in inquiry and persistent in seeking results which are as precise as the subject and circumstances of inquiry permit.

The dispositions taken from this critical thinking definition are 1) well informed, 2) willing to consider, 3) clear about issues, 4) focused on inquiry, 5) honest in facing personal biases, 6) diligent in seeking relevant information, 7) reasonable in selection of criteria, 8) prudent in making judgements and 9) persistent in seeking results.

Finally, our framework also draws from Ennis' (2015, 41-42) most recent iteration of his work on critical thinking taxonomy (Appendix A). The taxonomy lists a range of dispositions and abilities. The dispositions and abilities are the actions that students can demonstrate the application of critical thinking skills. We have thus identified and included the related critical thinking dispositions and related critical thinking abilities, as highlighted in Figure 1, as a core focus on our framework to analyse the students' group reports.

In summary, Figure 1 illustrates that our framework was derived from identifying the parts of the Facione definition and those from Ennis' lists of dispositions and abilities those that would apply (in bold) to business students when required to demonstrate critical thinking such as in business reports. We then summarised and simplified these applicable components into four main criteria that informed the rubric and guided the two methods of analysis used, as discussed in the following section.

2.2 Data analysis

There are two methods of analysis: using a rubric and content analysis. Firstly, a marker external to the subject lecturers and researchers performed independent marking of all 100 student submitted reports using a critical thinking assessment rubric (Appendix B)

The assessment rubric included four criteria:1) critical evaluation of issues, 2) development and presentation 3) application of theories and ideas to real-world context and 4) synthesis of ideas, theories and/or data.

Secondly, we conducted a content analysis using our developed framework (Figure 1) until reaching saturation, which was a total of 49 out of 100 papers. Our content analysis enabled the collection of evidence from the students' reports to investigate to what extent critical thinking is evident. Unlike thematic analysis, content analysis allows analysing the data both qualitatively and quantitatively (Grbich, 2007; Mojtaba et al., 2013). This was achieved by drawing upon the related critical thinking definition, dispositions and abilities outlined in our framework against the four dimensions from the critical thinking assessment rubric used by the external marker: 1) critical evaluation of issues, 2) development and presentation 3) application of theories and ideas to real-world context and 4) synthesis of ideas, theories and/or data (Appendix B).

Each of the student reports was organised into computer files, using NVivo to manage the data. The first level of analysis involved assigning codes to each of the section of the reports using the four criteria from the assessment rubric (Appendix B). The second level of coding included coding for the 1) related sections of the critical thinking definition, 2) related dispositions and 3) related abilities taken from the critical thinking definition provided by the Delphi Report and the critical thinking dispositions and abilities drawn from Ennis' 2015 article.

3.0 Results

3.1 Rubric evaluation of reports

We begin this section by providing a summary of the results from the external marker's use of the critical thinking rubric. Overall, as shown in Table 1, the results from

evaluations of the 100 group reports indicate the percentage of students that performed "poor", "fair", "good" or "excellent" on each of the criteria.

Table 1. External evaluations using an assessment rubric

Criteria	Levels of achievement			
	4 (Excellent) *N=100*	3 (Good) *N=100*	2 (Fair) *N=100*	1(Poor) *N=100*
Critical evaluation of issues	Systematic, in-depth critical evaluation of issues presented 42%	Mostly critical evaluation of issues presented with minor exceptions 52%	Some critical evaluation of the issues is presented but main points are often biased and lack critical analysis 6%	Inaccurate or no critical evaluation presented; points are biased 0
Development and presentation of arguments	Excellent, logical and relevant arguments incorporating critical use of research that considers the alternative arguments 42%	Mostly logical and relevant arguments which sometimes incorporates critical use of the research that considers the alternative arguments 38%	Less clear, logical and relevant arguments which do not incorporate critical use of the research that considers the alternative arguments 20%	Undeveloped or lack of logical and relevant arguments which do not incorporate critical use of research that considers the alternative arguments 0
Application of theories and ideas to real world context	Theories and ideas are presented with obvious application and use for a real-world context 35%	Most theories and ideas are presented with a clear link to a real-world context 39%	A real-world context is mentioned, but theories and ideas are not strongly linked 26%	There is no mention of a real-world context or how theories and ideas may be diffused 0
Synthesis of ideas, theories and/or data	The main points are clearly and precisely analysed and interpret ideas, theories and data 37%	The main points are mostly clear and precise, with competently analysed ideas, theories and data 38%	A few main points are not clear, and analysis of ideas, theories and data could be interpreted better 25%	Ideas, theories and data put forth are not clear nor precise, and are not well interpreted 0

As indicated in Table 1, while no group report was marked "poor" on each of the criteria, there is an indication of the range of levels across each of the criteria rated as

"fair", "good" or "excellent". The limitation of the assessment rubric results is that we are not given information on which critical thinking dispositions and abilities students have or have not demonstrated. In the next section, we present an evaluation of the data drawn from our content analysis of the student reports using our established framework.

3.2 Application of our framework

The findings drawn from a content analysis of the student reports using our established framework presents a novel approach to identifying evidence of the core elements of critical thinking dispositions and abilities that are demonstrated and/or lacking. Our framework provides the means to analyse the intersections between criteria from the rubric, and those taken from the Delphi Report and the critical thinking dispositions and abilities drawn from Ennis' 2015 article. Table 2 provides the number (n = 49) and percentage of papers that demonstrated from high to no evidence of critical thinking dispositions and abilities while Figure 2 illustrates an understanding of the intersections between criteria. It provides us a deeper look into the interplay between the four critical thinking criteria as evidenced in the student reports.

Table 2. Critical thinking framework evaluations

Criteria	High level evidence *N=49*	Mostly high evidence *N=49*	Less evidence *N=49*	No evidence *N=49*
Critical evaluation of issues	24 (49%)	0	17 (35%)	8 16%
Development and presentation of arguments	17 (35%)	9 (18%)	18 (37%)	5 (10%)
Application of theories and ideas to real world context	14 (29%)	3 (6%)	32 (65%)	0
Synthesis of ideas, theories and/or data	12 (24%)	9 (18%)	19 (39%)	9 (18%)

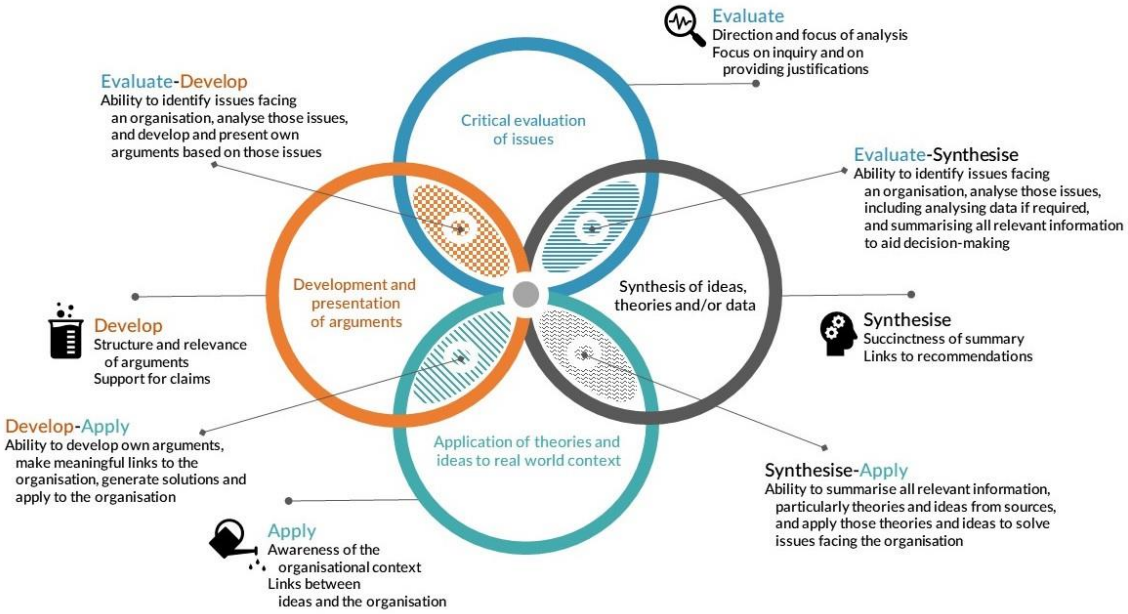

Figure 2. Summary of findings: intersections between criteria

A full explanation of the findings of each criterion is described in further detail below, illuminating the level of evidence of the critical thinking dispositions and abilities demonstrated for each of the four assessment rubric criteria.

3.2.1 Critical evaluation of issues

The critical evaluation of issues was identified in the introduction of the students' reports. The introduction provided information about the selected organisations and the justification for the chosen organisation and optimisation problem identified as core to the report. Half (24 out of 49) of the reports provided evidence of high level of critical thinking. At the outset, these reports were found to align with the related critical thinking definition since they included a well-informed and succinct overview of the selected company, a clear direction and argument of the report, an explicit focus on the inquiry of the selected organisation and optimisation problem and a persuasive explanation of the relevant information and criteria used to make the decision.

The application of the identified dispositions was evident since the reports included relevant information from documentation and resources sourced from the

selected organisation, such as from websites and annual reports to support and justify the chosen optimisation problem. This aligns with the dispositions outlined in our framework: ‘seek and offer clear statements of the thesis or question’, ‘seek and offer clear reasons’, ‘well-informed’, and ‘use credible sources and observations, and usually mention them’.

Evidence of critical thinking abilities was evident when the reports included a description and justification for the selected optimisation problem. These reports highlighted the relevance of the optimisation problem to the organisation’s profile, goals and/or vision. This aligns with the critical thinking abilities to analyse arguments, make and judge inductive references and arguments. Moreover, a strong case for the critical thinking abilities was demonstrated as a sound argument on the importance of researching the optimisation issue selected was offered in the reports.

While about half of the reports indicated a high level of critical thinking as evident in the introduction of the reports, many reports (17 out of 49) showed less evidence of critical thinking dispositions and abilities and eight showed no evidence of critical thinking. In contrast to the reports that demonstrated evidence of the dispositions and abilities, the reports were brief in the overview and justification for the selected organisation and optimisation problem. This was evident as the reports did not include explicit information from documentation and/resources sourced from the company itself to support the optimisation problem selected. For instance, one report noted that the company had a positive performance during 2016 and that it did not perform well from a cost perspective, however, it did not include reference to figures or data to support such claims. In turn, such claims did not align explicitly with the optimisation problem selected. Furthermore, the relevant critical thinking disposition and abilities were not demonstrated since the relevance of the optimisation problem to the company profile,

goals and/or vision were not made. The reports, overall, lacked a strong argument to research the optimisation problem selected.

Eight reports demonstrated no evidence of critical thinking as the reports did not draw on research from the selected case and literature to justify the selected optimisation problem. Thus, the reports did not include an argument to research the optimisation problem selected.

3.2.2 Development and presentation of arguments

The development and presentation of arguments was captured in the body of the reports that provided an analysis of the strengths and weaknesses of the literature garnered to understand, assess and make decisions and recommendations regarding the optimisation problem identified in the selected organisation. Seventeen of the 49 reports provided a consistent level of evidence for critical thinking dispositions and abilities and nine provided mostly logical and relevant arguments. Of the 49, 18 were less clear and five were undeveloped and therefore did not clearly demonstrate the ability to provide a coherent and relevant argument.

Alignment with the related critical thinking definition was evident in reports that were able to posit the relevance of literature collected in supporting the evaluation of the optimisation problem. These reports were clear about the issues raised in the collected articles and were able to identify these key issues raised in the articles by showing their relevance to the organisation selected. Demonstration of critical thinking dispositions was evident in reports that analysed the literature and an argument unfolded via this analysis of well-informed and credible sources throughout. These reports concluded with arguments and judgements of the relevance of the stated literature to the optimisation problem of focus.

In contrast, reports that indicated challenges in applying critical thinking provided a less clear or undeveloped argument. Arguments that were less clear merely provided a list and outline of selected articles without discussion and analysis of the relevance of the literature to the optimisation problem selected. Although these reports included an argument or position, explicit details of the articles were missing and the reports provided general rather than explicit statements, for example, comments such as ‘large amounts of data’, that the data ‘give clear insight’ or ‘the information/data is limited’ without the inclusion of explicit details and evidence of data to support such claims and how they were relevant to the optimisation issues under discussion and evaluation.

Reports that indicated undeveloped or lack of logical and relevant argument were lacking in critical thinking dispositions as they simply provided a list of articles and topics. In addition, the reports’ conclusions included generalised statements that the ‘articles’ support or are relevant to the optimisation problem. These reports illustrate that students lacked the critical thinking abilities to develop a sound and persuasive argument as they did not show a coherent and logical discussion of the analysis of the literature, the formation of an argument and the use of credible sources.

3.2.3 Application of theories and ideas to real-world contexts

Fourteen out of 49 reports consistently and three reports mostly demonstrated the application of theories or ideas to a real-world context. The 14 reports were able to establish links between the discussion of the strengths and weaknesses of the collected articles and the decision process presented. In doing so, the reports presented evidence of the ability to demonstrate the decision-making process required to identify the knowledge gaps and limitations and, if relevant, to point to any suggestions for improvement(s) relevant to the real-world context of the selected organisation. These reports were further able to demonstrate the application of critical thinking as the analysis of the literature was

linked to the realities of the organisation under investigation. To that end, the reports used relevant information from the literature and information about the realities of the organisation. Thus, evidence for critical thinking dispositions was present in such reports because they included justifications for the links made. Further, explicit links were also made to the information and sources used while not losing focus of the context of the organisation, such as in the context of the economic climate or political or social concerns relevant in contemporary society. The critical thinking abilities were thus visible as the reports presented such links in a coherent, succinct and logical manner.

Despite the 14 reports that provided evidence of critical thinking consistently and three mostly, it is a concern that more than half of the reports lacked direct links to the real-world context. That is, 10 mentioned a real-world context but were unable to show a strong link to theories and ideas, while 22 reports did not mention the real-world context at all. The reports that disclosed the inability to make explicit links to the real-world context of the selected organisation indicated the lack of critical thinking to seek out relevant information from the literature, the organisation and wider social or economic or political climate. Furthermore, these reports exposed a lack of critical thinking dispositions as the reports did not include well-informed and credible sources to ensure the links to the real-world context were made. In addition, the reports did not demonstrate critical thinking abilities as the credibility of sources were not verified and they were short of coherence and logical presentation.

It seems that for the most part, many reports indicate that students face challenges in applying critical thinking dispositions and abilities as 22 reports did not make any link to the real-world context. These reports merely offered a list of different topics from different articles which were broadly, rather than directly, related to the optimisation problem selected. There did not appear to be a clear link between the literature, the

organisation and the optimisation issue selected. At times, this was the case because the optimisation issue had not been clearly identified at the outset in the report.

3.2.4 Synthesis of ideas, theories and/or data

The synthesis of ideas, theories and/or data was determined via the content analysis of the discussion and conclusion section of the reports. The reports that provided a high level of evidence included a coherent and succinct summary of the analysis and interpretation of the ideas, theories and data that had been presented throughout the report. In doing so, the reports provided a coherent and logical link to a final recommendation and/or decision. However, just over half of the reports indicate challenges in utilising critical thinking dispositions to construct a coherent synthesis of the report. While twelve out of 49 papers were able to consistently provide a summary of the main points clearly and precisely and analysed and interpreted ideas, theories and ideas, and nine reports achieved this most of the time, few points in these nine reports provided a clear analysis of ideas and theories. In addition, the data presented lacked interpretation in 19 reports while nine reports were not clear or precise at all.

4.0 Discussion and recommendations

The purpose of this paper was to present the findings of a study that investigated to what extent the student group reports provide evidence that students were able to demonstrate critical thinking. Using our developed framework to identify evidence of critical thinking, the key critical thinking dispositions and abilities were used to analyse to what extent critical thinking was evident in the student group reports.

It was found that there is a marked distinction between reports that were able to illustrate critical thinking and those with less evidence or no evidence of critical thinking. For the most part, the reports that lacked evidence of critical thinking did not draw on,

evaluate or interpret research to justify and argue the position and decisions presented in the group report.

We believe that some of the issues and challenges identified could be avoided if the following strategies are initiated by teaching staff during the semester. That is, providing students guidance on how to approach assessment tasks, using exemplars, and providing resources to improve critical thinking. We believe that the recommendations are relevant to the business education community specifically and the higher education sector generally.

4.1 Providing students guidance on how to approach an assessment

Students should be given guidance on identifying and applying critical thinking disposition and abilities. This should include outlining to students a clear report structure and providing guidance specific to particular approaches to assessment to increase student self-regulation and accountability. This serves as a diagnostic and feedback tool for students to self-assess their progress. Consultations with individual students or groups to keep track of their progress or 'milestones' is one example. The aim of this is to promote a culture of providing feedback to improve one's (or the team's) work and discouraging 'cramming' or putting in extensive yet often hastened work just before submission or due date. Research suggests that feedback that does not include specific guidance on how to improve could have a negative impact on learning (Köller, 2001; Pryor & Torrance, 1998; Swaffield, 2008).

Providing business students guidance should also be directed towards modelling behaviour. Modelling provides various approaches to tackle an assessment task. Guidance should be directed towards aligning the assessment with critical thinking as a learning outcome so that academic teaching staff can ensure that they include

opportunities for critical thinking in teaching and learning activities and assessment design (Erikson & Erikson, 2019).

4.2 Providing students with resources to improve academic writing

Students' lack of critical thinking can be due to problems with academic writing. A study on international students in British universities (Fell & Lukianova, 2015; Shaheen, 2016) found that previous learning practices, English language abilities, cultural dimensions and awareness of academic expectations in a new setting all play a part. This requires guidance on the ability to write about the relevant information accessed, providing evidence to support claims made by others, arguments and counter-arguments, varied views and perspectives and own insights and conclusions. In some cases, as Davies (2003) argues, it is a matter of learning "academically acceptable linguistic genre patterns or writing conventions" (p. 4).

Critical thinking is arguably a Western concept (Egege & Kutieleh, 2004). A large number of students participating in higher education in the UK, Australia, the US or Canada are international students who bring with them their 'own ways of learning' or their 'own ways of being critical'. For example, academics in the UK lamented that students were unable to provide strong arguments and their writing was descriptive (Barker et al., 1991; Bradley & Bradley, 1984; Egege & Kutieleh, 2004). However, this was presumably because they were not trained to think and write this Western way before they came to the UK (Davies, 2003). It is important to recognise this, particularly for first-year students who are from non-English speaking backgrounds who presumably will already struggle with learning English let alone use this language to show critical thought. However, we do not suggest unnecessary accommodation or a compromise in the quality of student work. To recognise is to know where students are coming from and to point them to the right avenues for support if needed.

4.3 Providing exemplars

As noted above, we found many reports that effectively demonstrated the application of critical thinking. Thus, such reports could be used as exemplars as an indicator of expected levels (Carter et al., 2018; Lipnevich et al., 2014) including explicit criteria and standards (Newlyn & Spencer, 2010; Sadler, 1987) and used as a formative feedback tool (Bruno & Santos, 2010; Handley & Williams, 2011). We suggest that academics not only provide exemplars that show good quality but also those that show low quality. The latter provides an opportunity for academics to communicate the typical mistakes that can be avoided, raise the quality of assessments expected and align the assessment more closely with the learning outcomes. Without exemplars, it would prove difficult to establish a reference point.

4.4 Providing students resources to improve critical thinking

There are suggestions available from the literature on how to teach critical thinking in business education (see McEwen 1994; Nentl and Zietlow 2008). There are also resources that are dedicated to improving critical thinking elsewhere. To augment such advice, we list a number of skills, dispositions and abilities proposed by Ennis (2015, pp. 41-42) (Appendix A) and we have adapted them to suit a business student (Appendix C). We encourage business academics to locate spaces in their curriculum to which they could be integrated, either in teaching, learning or assessments activities. The dispositions and abilities can be displayed in a variety of student-teacher engagements such as class participation, written assessments, oral presentations, debates, simulations, peer or group work and so on. The examples in Appendix C use a written assessment, particularly in group settings, which would address some of the issues in writing we have identified earlier. Note that not all application examples should appear in the student's written work.

4.5 Practical suggestions for teaching critical thinking

Other than the four main recommendations we offer above and the application examples provided in Appendix C, we find that it is important to provide business educators with some practical suggestions on how to teach critical thinking (i.e., improve pedagogical practices). Our sample, including analysis and recommendations, reflects the performance of domestic and international masters students which we believe could be similar to other mixes of students in universities elsewhere globally. Thus, to stay consistent and aligned with our study, we offer a few other practical suggestions that are also consistent with earlier research findings.

First, students should be taught how to make decisions. There is considerable value in teaching students managerial decision making (Smith, 2003). To do so, the opportunities offered, such as questioning, dialogue, problem identification and resolution, should allow students to focus on organisational effectiveness. As a key feature of critical management studies, decision making may only be successful in classroom contexts if a sufficient breadth of material about issues facing organisations is available. Second, allow for cognitive dissonance to exist. Dissonance creates challenge and curiosity while allowing students to seek new knowledge and modify their own understanding due to the presence of inconsistent beliefs or attitudes (Boyce & Greer, 2013; Chabrak & Craig, 2013; Wilkin, 2017). Third, target dispositions specific and appropriate to the subject being taught.

As business studies encompass many disciplinary fields, what would work for accounting may not work for economics. For example, to “try to be well informed”, “use credible sources and observations” and “seriously consider other points of view” must take into account the nuances of the disciplines and design teaching, learning and

assessment tasks (TLAs) that require students to specifically display these dispositions. Interpreting investment income and their tax implications, evaluating the impact of a housing market bubble on the economy or changing portfolio investment decisions to maximise retirement income, as examples of TLAs, would require alignment to dispositions emphasised in the course to improve students' critical thinking. Fourth, use effective questioning techniques. To engage students in critical inquiry, business educators should include in their teaching a repertoire of questions that challenge thinking. This can include project-based collaborative activities (Snyder & Snyder, 2008) or case studies designed to think complexly about a particular issue. These are a few of the most effective teaching methods used (McEwen, 1994). Lastly, instructors should model the critical thinking process. This not only assists students whose prior educational background did not feature critical thinking as much as other skills but also narrows the misperceptions gap between students and lecturers. This requires refinement, review and feedback loops to get students where instructors want them to be.

5.0 Limitations, further research and implications

We only examined 100 student reports and conducted a content analysis of 49 reports, from a single subject from one faculty and university. We believe that the strength of our contribution is that our examination provides a new approach (our framework) to assess critical thinking that previous research has not included. Our framework assesses a comprehensive understanding of critical thinking and moves beyond its assessment via the use of standardised testing instruments.

To extend our study, future research can include the analysis of assessment using our framework taken from other business fields such as accounting, finance, economics

or marketing. Future research can also include comparisons between business schools within the same country or different countries.

The implications of our study for business education, specifically, include the rethinking of how the business curriculum design, delivery and assessment could be further redesigned to integrate critical thinking as an important employability skill. More broadly, however, the implications for higher education include benchmarking our curriculum with what the industry needs and reinforcing to students how critical thinking is useful, both in conceptual and practical aims. We believe, therefore, that there is a serious need for continued research into critical thinking in business education particularly on how critical thinking is exhibited in professional practice and how employers view critical thinking. Such research will be useful in identifying further teaching and assessment strategies for solving real problems and issues, including ethical dilemmas. One of the major challenges for universities is how to embed professional practice in the classrooms where critical thinking, particularly the associated dispositions and abilities, can be effectively integrated into the teaching, learning and assessment activities to enrich their course experience. We believe our framework provides an important contribution to the business teaching and learning research and literature.

6.0 Conclusion

We assessed student group reports against the development of critical thinking skill using a framework we developed. The framework has enabled us to identify the extent to which students demonstrated the acquisition of critical thinking. This enabled us to offer some practical suggestions. There are other considerations we could investigate when implementing practical solutions in the classroom. One is to examine more carefully the importance of cultural dimensions in developing critical thinking, as we have mentioned

earlier. Student diversity can play a bigger role in understanding how students develop critical thinking in educational settings where it is highly praised and practised. We also recommend that business instructors clearly demonstrate to business students how to locate and make meaning of relevant information, analyse and evaluate arguments made by others, form their own arguments, counter-arguments and objections and construct their own informed conclusions when faced with a business problem or situation. As critical thinking requires dispositions and abilities, instructors should know which of these would be most applicable in business contexts.

As work and workplaces continue to change, and increasingly becoming boundaryless, business schools must focus on developing students' critical thinking that not only serve local, regional, or national businesses where students could participate in but also the necessary skills to actively perform in a global marketplace where diversity, inclusion and cross-cultural knowledge are key. Also, as many business courses emphasise working in teams as critically important, it would hold strong value to students (now and later in life) if they can effectively display the dispositions that relate to themselves and others. Preparing future business leaders who think critically could ensure business sustainability and ethical business practices.

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Appendix A: Ennis' (2015) critical thinking taxonomy

Critical thinking dispositions
Ideal critical thinkers are *disposed to*
1. seek and offer clear statements of the thesis or question,
2. seek and offer clear reasons,
3. try to be well informed,
4. use credible sources and observations, and usually mention them,
5. take into account the total situation,
6. keep in mind the basic concern in the context,
7. be alert for alternatives,
8. be open-minded
a. seriously consider other points of view,
b. withhold judgment when the evidence and reasons are insufficient,
9. take a position and change a position when the evidence and reasons are sufficient,
10. seek as much precision as the situation requires,
11. try to "get it right" to the extent possible or feasible, and
12. employ their critical thinking abilities.

Critical thinking abilities
Ideal critical thinkers have the *ability* to
1. have a focus and pursue it,
2. sanalyse arguments,
3. ask and answer clarification questions,
4. understand and use graphs and maths,
5. judge the credibility of a source,
6. observe, and judge observation reports,
7. use their background knowledge, knowledge of the situation, and previously established conclusions,
8. deduce, and judge deductions,
9. make, and judge, inductive inferences and arguments (both enumerative induction and best-explanation reasoning),
10. make, and judge, value judgments,
11. define terms, and judge definitions,
12. handle equivocation appropriately,
13. attribute and judge unstated assumptions,
14. think suppositionally, and
15. deal with fallacy labels.

Three nonconstitutive but helpful abilities that ideal critical thinkers possess are to:
16. be aware of, and check the quality of, their own thinking (metacognition),
17. deal with things in an orderly manner, and
18. deal with rhetorical strategies.

Appendix B: Critical thinking rubric

Criteria	Level of achievement			
	4 (Excellent) Yes…	3 (Good) Yes, but…	2 (Fair) No, but…	1 (Poor) No…
Critical evaluation of issues	Systematic, in-depth critical evaluation of issues presented	Mostly critical evaluation of issues presented with minor exceptions	Some critical evaluation of the issues is presented but main points are often biased and lack critical analysis	Inaccurate or no critical evaluation presented; points are biased
Development and presentation of arguments	Excellent, logical and relevant arguments incorporating critical use of research that considers the alternative arguments	Mostly logical and relevant arguments which sometimes incorporates critical use of the research that considers the alternative arguments	Less clear, logical and relevant arguments which do not incorporate critical use of the research that considers the alternative arguments	Undeveloped or lack of logical and relevant arguments which do not incorporate critical use of research that considers the alternative arguments
Application of theories and ideas to real world context	Theories and ideas are presented with obvious application and use for a real world context	Most theories and ideas are presented with a clear link to a real world context	A real world context is mentioned, but theories and ideas are not strongly linked	There is no mention of a real world context or how theories and ideas may be diffused
Synthesis of ideas, theories and/or data	The main points are clearly and precisely analysed and interpret ideas, theories and data	The main points are mostly clear and precise, with competently analysed ideas, theories and data	A few main points are not clear, and analysis of ideas, theories and data could be interpreted better	Ideas, theories and data put forth are not clear nor precise, and are not well interpreted

Appendix C: Critical thinking dispositions and abilities and examples of business applications

Critical thinking dispositions Ideal critical thinkers are *disposed to*	**Application examples in business contexts**
1. seek and offer clear statements of the thesis or question,	Gather as much information about a business case, problem or question and describe it clearly
2. seek and offer clear reasons,	Identify and write down reasons for claims or arguments
3. try to be well informed,	Read a number of academic sources not just a few; if a business case, read public information about the company and credible articles or news reports
4. use credible sources and observations, and usually mention them,	Use peer-reviewed journals or books; Avoid citing 'fake news', authorless articles or robot-written texts; use resources wisely in the text
5. take into account the total situation,	Read different perspectives on the same issue or problem
6. keep in mind the basic concern in the context,	Stay focused on the main idea or business problem
7. be alert for alternatives,	Determine alternative courses of action to solve a business case or problem and weigh them
8. be open-minded a. seriously consider other points of view, b. withhold judgment when the evidence and reasons are insufficient,	Be receptive to new ideas; do not discard information just because it is not supporting your idea; welcome other team members' ideas or contributions, appreciate those ideas, and show them in the written work; do not offer conclusions just because one article said so
9. take a position and change a position when the evidence and reasons are sufficient	Take a position on a business decision and assess its implications, and change if the evidence supports
10. seek as much precision as the situation requires,	Be clear and precise in communicating findings
11. try to "get it right" to the extent possible or feasible, and	Avoid too many iterations; find the one best solution and avoid ambiguity
12. employ their critical thinking abilities.	Employ the abilities as stated below

Critical thinking abilities Ideal critical thinkers have the *ability* to	
1. have a focus and pursue it,	Focus on solving a business problem and actually doing it
2. analyze arguments,	Analyse arguments in relation to business
3. ask and answer clarification questions,	Ask and answer clarification questions relevant to the problem, issue or situation
4. understand and use graphs and maths,	Use equations, table or graphs to illustrate findings or solutions
5. judge the credibility of a source,	Evaluate if business sources are credible and reliable
6. observe, and judge observation reports,	Observe and judge business reports

7. use their background knowledge, knowledge of the situation, and previously established conclusions,	Use students' background knowledge, new information and previous solutions to business problems
8. deduce, and judge deductions,	Draw logical conclusions and judge conclusions or business solutions
9. make, and judge, inductive inferences and arguments (both enumerative induction and best-explanation reasoning),	Form inferences based on specific instances, situations and contexts and evaluate whether they are applicable
10. make, and judge, value judgments,	Make and assess value judgments whether appropriate or not in business
11. define terms, and judge definitions,	Define business terms and judge definitions
12. handle equivocation appropriately,	Be precise and avoid vague language when defining business terms
13. attribute and judge unstated assumptions,	Provide convincing support for arguments and know when assumptions are acceptable or not
14. think suppositionally, and	Think of possibilities when confronted with a business decision (eg. if a then b)
15. deal with fallacy labels.	Identifies flaws in reasoning and arguments in business decision making

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Assessing critical thinking in business education: key issues and practical solutions

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