# Developing critical thinking through student consulting projects

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## Abstract:

The authors present survey results from faculty at 44 universities on the role of student consulting projects in developing business students' critical thinking. They conclude that students can improve critical thinking by engaging in guided primary and secondary research to inform their business assumptions that underpin business planning and financial modeling in consulting projects. Results also suggest that instructors newer to the practice of using student consulting tend to emphasize objective results (e.g., application of disciplinary skills and research methods), whereas experienced users seem to focus on the subjective consulting process (e.g., managing client relationships and evaluating information quality and fit for the project).

**Keyword:** consulting | critical thinking | experiential learning | judgment

## Article:

### Introduction

The National Council for Excellence in Critical Thinking defined critical thinking as the "intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (Scriven & Paul, Citation1987). It is just this set of skills that business schools seek to develop in their students. Reynolds (Citation2011) held that critical thinking gives due consideration to the following:

• Establishing real, useful evidence
• Applying context skills to separate the problem(s) from context
• Constructing and applying relevant criteria for making judgments
• Choosing proper techniques or methods for forming a judgment
• Using theoretical constructs appropriate to the problem

Experiential learning is one of the best methods in business education to teach critical thinking skills (Ames, Citation2006; Muir, Citation1996). In this article, we argue that student consulting projects require students to use critical thinking involving higher levels of Bloom's taxonomy, that is, analyzing, synthesizing, and evaluating information, with the latter comprising levels 4, 5, and 6, respectively, in terms of increasing cognitive complexity (Forehand, Citation2005). Whereas classroom activities are generally aimed at the lower levels of Bloom's taxonomy, student consulting projects require students to analyze the elements of a business problem, synthesize information from a variety of sources, evaluate data to determine whether it is germane to the problem, and employ acquired knowledge in creating solutions (Dwyer, Boswell, & Elliot, Citation2015; Kunkel, Citation2002).

The student consulting project is an experiential activity that is widely recognized among business educators (Heriot & Campbell, Citation2002; Sciglimpaglia & Toole, Citation2010). There is a clear incentive for business schools to connect with industry partners to develop consulting projects for guided student learning. Consulting work compels students to tackle timely challenges that are meaningful to their clients and communities (Madison & Chawla, Citation1998). Small businesses in particular have much to gain from connecting with student consultants because these firms do not have the research and development resources of large firms. Client-based business consulting projects typically involve students in creating or evaluating a business plan, feasibility study, or market research study which can support local community or university alumni economic development (Madison & Chawla, Citation1998).

Consulting can be conducted by individual students or groups of students, can be used as with both undergraduate and graduate business students, and can be implemented in the context of any of the business disciplines. Bove and Davies (Citation2009) emphasized that "client-sponsored projects … show how research is an active process as opposed to a collection of isolated techniques to be passively learned" (p. 231). As consultants to businesses, students learn to examine the applicability of theories and industry indices to the projects they undertake on behalf of their clients (Cook & Belliveau, Citation2006); this focus on critical thinking and application of knowledge furthers an instructor's goal of closing the theory-applications expectations gap (Stern & Tseng, Citation2002). However, there is little extant evidence that clarifies which activities conducted during student consulting projects are actually linked to student competency development in critical thinking.

In this article we explore how student critical thinking skills might be developed by consulting projects, as well as faculty opinions about related judgment abilities of students doing consulting work. The approach used is that of expert validation of a set of student judgment tasks believed to be important to the furtherance of student critical thinking.

**Literature**

We believe that foremost among the aims of student consulting projects is the development of critical thinking. Wheeler (Citation2008) noted that students themselves perceived their marketing projects to involve critical thinking. However, for student consulting projects to convert to student learning, educators must ask students to reflect on the judgment abilities that they are employing during their consulting work (Frontczak & Kelly, Citation2000; Gremler, Hoffman, Keaveney, & Wright, Citation2000; Grossman, Citation2002; Reid & Anderson, Citation2012). Hence, a foundational understanding of the critical thinking construct and related judgment tasks is required prior to designing student consulting assignments.

**Critical thinking and related competencies**

Critical thinking … entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question at issue; assumptions; concepts; empirical grounding; reasoning leading to conclusions; implications and consequences; objections from alternative viewpoints; and frame of reference. (Scriven & Paul, Citation1987). The foregoing definition can be condensed into three principal student learning goals, as follows:

(a) *Evaluating purpose or problem*
(b) *Evaluating information as a guide to belief and action*
(c) *Evaluating assumptions and frames of reference (i.e., contexts)*

Although multiple definitions exist for both information literacy and critical thinking, Albitz (Citation2007) concluded that "information literacy is a large component of critical thinking-to think critically, a student needs to be able to gather and assess information. Too many components of these two concepts overlap to believe that they are inherently different" (p. 107). We take the stance that information literacy is a vital dimension of the critical thinking learning goal, rather than treating it as a discrete and separate concern. Each of the foregoing competencies (a–c) is now examined in turn.

Evaluating purpose or problem

Normally, student consultants work with their client to refine the statement of purpose for the consulting project, in an ongoing "social process of dialogue or debate to refine problem definitions" (Thomas & Schwenk, Citation1983, p. 31). Students operate within a dynamic consulting environment where the decision landscape is continually evolving. Client expectations and ongoing real-life constraints continuously impact and alter project goals and working assumptions as well as the availability of and perceived utility of information. (Cook & Belliveau, Citation2006; Heriot, Cook, Jones, & Simpson, Citation2008).

Evaluating information

Students additionally need to evaluate the usefulness, validity, and reliability of available sources of information for use in the project. Holler (Citation2010), in her analysis of 99 student consulting projects conducted between 1995 and 2008, found strong indications of both primary and secondary information use, with interviews, reports or data from government entities and trade associations, and nonauthoritative secondary resources (e.g., websites) comprising the most favored sources of information. However, she drew attention to several concerns about student use of information in their consulting work, such as using reference material of questionable authority and neglecting to provide the client with clear or complete citations. Information evaluation appears to be a difficult task for students, because "the most basic critical thinking skills required for matching subject relevance with appropriate sources of information are sorely missing in the vast majority of undergraduates" (Oberman, Citation1991, p. 192).

Evaluating assumptions and frames of reference

Evidence suggests that students are not considering how well theories and rules of thumb learned in the classroom apply to specific client industry or market conditions (Lloyd & Williamson, Citation2008). Furthermore, although there is solid ground for wanting students to display these three competencies during consulting work, there is also evidence that students will demonstrate judgment heuristics that interfere with their ability to demonstrate critical thinking.

**Judgment and the concept of heuristics (or adaptive decision making)**

Research suggests that decision makers respond to complexity in decision making by limiting rather than enlarging information search and evaluation processes, partially due to the personal mental and temporal costs of information search (Mallard, Citation2012; Winter, Citation1971). Global rationality (the search for and use of full information along with systematic and structured rationalizations) is most often viewed as a decision-making ideal that is seldom achieved (especially in student projects). Its more common alternative, bounded rationality, involves the exhibition of adaptive or constraining decision behaviors, and is the more pervasive approach among students and business people in general (Hogarth & Karelaia, Citation2012; Katsikopoulos, Citation2011; Warwick, Rimmer, Blandford, Gow, & Buchanan, Citation2009).

Two adaptive behaviors that continue to surface in discussions of decision making are satisficing and heuristics (Gigerenzer, Citation2015; Simon, Citation1990; Tversky & Kahneman, Citation1974; Weber & Johnson, Citation2009). Satisficing refers to the tendency to search for alternatives only until a solution is found that meets some acceptable minimal standard or is seen as sufficing when project deadlines are fast approaching (Simon, Citation1990; Winter, Citation1971). Heuristics are defined as adaptive "mental" shortcuts that people use to make judgments and solve problems quickly and efficiently (Gigerenzer, Citation2015; Gigerenzer & Gaissmaier, Citation2011). Heuristics include the following concepts: (a) representativeness, (b) availability, and (c) adjustment and anchoring (Tversky & Kahneman, Citation1974).

Representativeness bias is a tendency for people to use anecdotal information or small samples (statistical n sizes) to make decisions. In the consulting situation, this may occur when the opinions of powerful individuals, such as the client or the instructor, take precedence over a more balanced survey of opinions or options. Availability bias refers to instances where decision makers regard more salient or easily obtained data as sufficiently conclusive, rather than expending additional cognitive or physical effort on the decision activity. Student consultants may exhibit tendencies to shortcut their research efforts due to poor time management or lack of motivation. Finally, adjustment and anchoring occurs when decision makers formulate strong initial impressions and subsequently disregard any new conflicting data; basically, individuals "anchor" themselves to prior beliefs and refuse to "adjust" perceptions even though new information calls into question the path they have decided to take. For example, students may be "stuck" in beliefs about a company based on personal knowledge.

To better comprehend the role of adaptive decision making and bounded rationality in student consulting, we adopt the approach of Robert Ennis (Citation1962), who linked 12 human judgment tasks to the process of critical thinking:

1. Grasping the meaning of a statement
2. Judging whether there is ambiguity in a line of reasoning
3. Judging whether certain statements contradict each other

4. Judging whether a conclusion follows necessarily
5. Judging whether a statement is specific enough
6. Judging whether a statement is actually the application of a certain principle
7. Judging whether an observation statement is reliable
8. Judging whether an inductive conclusion is warranted
9. Judging whether the problem has been identified
10. Judging whether something is an assumption
11. Judging whether a definition is adequate
12. Judging whether a statement made by an alleged authority is acceptable (p. 84)

Looking further at these various judgment tasks that are tied to the quality of critical thinking, it is easy to see how students might display bounded rationality, that is, in lacking ability or willingness to take time to judge the adequacy of a problem (statement 9) or definition (statement 11), to handle issues around reliability (statement 7) or contradictions in the data (statement 3), or to evaluate assumptions (statements 6 and 10) and recommendations (statements 4 and 8) against the actual consulting context and data acquired. In short, the main takeaway here is that underpinning the critical thinking skills of problem formulation, information evaluation, and assumption testing against context, there are specific judgment tasks that students may or may not be effectively carrying out during consulting work. The remainder of the paper explores faculty opinion about these judgment tasks and their importance to student consulting projects in the business environment.

**Method**

First we constructed a list of desirable judgment behaviors, following Ennis (Citation1962), that we believe reflect the principal critical thinking learning goals in student consulting projects (see Table 1). A manipulation check was conducted one on one with a convenience sample of 10 full-time faculty in management (2), marketing (3), information systems (2), international business (1), and entrepreneurship (2) to refine the survey items and assess their perceived relevance to the learning goals of interest in this study.

Subsequently, to get a preliminary feel for student judgment behaviors that are deemed most relevant to critical thinking in student consulting, we queried 44 full-time business school faculty who regularly use student consulting projects as part of their courses. Faculty opinions were collected using an electronic Qualtrics survey. A convenience sample was compiled using a snowball method via a national business school listserv forum. The survey link was live for a period of one month. We do not know if this was a representative sample or not, but we are convinced that respondents are relevant experts in how well their consulting assignments promote student critical thinking skills.

**Table 1.** Profile of respondents and courses where student consulting is used (n = 44).

| Characteristic | % | *M* | *SD* | Tercile cutpoints |
|---|---|---|---|---|
| Teaching field in which instructor uses student consulting assignments | | | | |
|    Management | 31.8 | | | |
|    Marketing | 29.6 | | | |
|    Entrepreneurship | 11.4 | | | |
|    International business | 18.2 | | | |
|    Other | 9.0 | | | |
| Level of courses where instructor uses student consulting assignments | | | | |
|    Undergraduate only | 59.5 | | | |
|    Graduate only | 19.0 | | | |
|    Both undergraduate and graduate | 21.5 | | | |
| Self-reported instructor experience with student consulting from zero to expert level | | | | |
|    Mean reported experience on scale of 0–100 | | 78.48 | 24.30 | < 73, ≥ 98 |

## Results and discussion

Tables 1 and 2 present available profile characteristics of instructor and university. More than half of respondents use student consulting in the management or marketing fields at the undergraduate level. A mix of public, private, and foreign universities were represented, with no dominant classification in terms of research activity level. Mean reported instructor experience with student consulting was 78 on a 100-point scale. No significant associations were found among the school or course characteristics seen in Tables 1 and 2 and ratings of the survey items studied. Responses do not appear to be impacted by the instructors' fields, student class levels, or institutional settings, suggesting that other factors drive instructors' use of consulting projects in business programs.

**Table 2.** Profile of schools (n = 44).

| Characteristic | % | *M* | *SD* | Median |
|---|---|---|---|---|
| School ownership across institutions | | | | |
|    U.S. public state institutions | 56.9 | | | |
|    U.S. private not-for-profit institutions | 21.3 | | | |
|    Foreign institutions | 26.8 | | | |
| Carnegie classification breakdown | | | | |
|    Master's: any level | 38.1 | | | |
|    Doctoral: moderate research activity | 28.6 | | | |
|    Doctoral: higher/highest research activity | 33.3 | | | |
| Other university sample characteristics | | | | |
|    University-wide size of student body | | 17,193 | 10,342 | 43,137 |
|    City population surrounding institution | | 102,074 | 143,650 | 46,550 |
|    City unemployment rate (%) | | 5.2 | 1.6 | 5.3 |
|    City job growth rate (%) | | 1.5 | 1.8 | 1.5 |

**Table 3.** Means and standard deviations (n = 44).

| Learning goal | Survey item wording | This judgment task is important to the quality of project outcomes | | My students demonstrate competence in doing this | | Students have control over completing this task | | Students are given instructions on how to perform this task | |
|---|---|---|---|---|---|---|---|---|---|
| | | M | SD | M | SD | M | SD | M | SD |
| Evaluating purpose or problem | Students review given facts or opinions to determine their weight or importance | 6.29 | 0.68 | 5.46 | 1.09 | 5.73 | 1.09 | 5.77 | 1.29 |
| | Students confirm that their project goals are adequately defined | 6.16 | 1.09 | 5.27 | 1.32 | 5.47 | 1.23 | 5.93 | 1.23 |
| | Students identify and consider the priorities of multiple stakeholders | 5.77 | 1.37 | 5.00 | 1.26 | 5.38 | 1.30 | 5.38 | 1.51 |
| Evaluating information as a guide to belief and action | Students gather data or information that is useful to the project | 6.69 | 0.51 | 5.93 | 0.81 | 6.16 | 1.07 | 6.33 | 0.69 |
| | Students make recommendations that are based on information and data | 6.43 | 1.13 | 5.68 | 1.16 | 6.23 | 0.77 | 6.09 | 1.29 |
| | Students recognize and resolve contradictory information and opinions | 6.04 | 1.09 | 4.94 | 1.38 | 5.25 | 1.25 | 5.60 | 1.23 |
| | Students assess the reliability of information used in the project | 5.68 | 1.31 | 4.57 | 1.34 | 5.20 | 1.37 | 5.16 | 1.41 |
| | Students assess the relevance of published or secondary information for the specific client context | 5.61 | 1.42 | 4.81 | 1.35 | 5.48 | 1.27 | 5.32 | 1.46 |
| Evaluating assumptions and frames of reference or contexts | Students apply skill sets, principles, and methods that are relevant to the project | 6.51 | 0.63 | 5.76 | 1.09 | 6.07 | 1.03 | 6.38 | 0.78 |
| | Students use research methods that are appropriate for the project | 6.40 | 0.69 | 5.51 | 1.08 | 5.58 | 1.23 | 6.13 | 1.12 |
| | Students make recommendations that are specific enough to guide the client's future action plans | 6.16 | 1.20 | 5.41 | 1.21 | 5.84 | 1.10 | 5.95 | 1.37 |
| | Students verify the accuracy of the assumptions they have made | 6.13 | 1.10 | 4.81 | 1.28 | 5.31 | 1.30 | 5.67 | 1.23 |

Descriptive statistics were calculated using SPSS version 24. Table 3 shows the means and standard deviations of ratings from the sample of 44 faculty evaluators. We required four responses for each of the items: whether the behavior was important to the project, whether students demonstrated competence, whether students had control over the behavior, and whether students were given instructions on how to perform the task. Mean importance ratings for most behaviors average six or higher ( across importance items = 6.16) on a 7-point Likert-type scale. In marked contrast, most of the ratings of student competence ( across competence items = 5.26) on these critical thinking behaviors are almost a full point lower than the importance ratings (mean difference of −0.89 with a difference range of −0.75 to −1.32 across the 12 statements).

Gaps were seen between importance and performance on all three of the main critical thinking competencies of problem formulation, information handling, and assumption testing. Faculty raters indicated that students were given relevant instruction ( across items = 5.81) and that students were perceived to have control over completing their tasks ( across items = 5.64). Hence, from this table we may infer that faculty ratings of student competence lagged behind the importance of the tasks and the level of instruction provided.

Some general observations may be made about the student consulting assignments by examining the data a bit further. First, behaviors that were rated higher on both importance and dedicated instructional time included

• Gathering data that is useful to the project;
• Applying skill sets and methods that are relevant;
• Making recommendations based on data and information;
• Using appropriate research methods.

Mean perceived student competence scores were also higher for these four items; in addition, students were perceived to have direct control over these behaviors. In contrast, there were several items that had comparatively lower importance ratings. These items involved handling multiple stakeholder needs, assessing information reliability, and assessing the relevance of published or secondary information for the project. Regarding student competency, the following received the lowest ratings ( < 5 on a 7-point Likert-type scale):

• Recognizing and resolving contradictory information;
• Assessing the relevance of published or secondary information
• Verifying the accuracy of assumptions they have made
• Assessing the reliability of information used in the project

It is noted that three of these items are ones directly related to competence in the information literacy component of critical thinking.

The data in Table 4 show that for all the given judgment gaps that students might demonstrate in consulting projects, "sometimes" or higher was the modal answer with two exceptions: "Students avoid collecting primary data" and "Students create generic reports or recommendations that are not client specific." As business school faculty, we have the expectation that consulting projects will build critical thinking skills, but the present findings show a lack of critical thinking. In fact, a great deal of the problem seems to lie with the information handling competency, both in terms of lack of effort in accessing and evaluating data and in terms of overreliance on low quality or minimal information.

**Table 4.** Frequency of behaviors indicative of bounded rationality (N = 44).

| Survey item wording | Never | Seldom | Sometimes | Often | All the time |
|---|---|---|---|---|---|
| Students have problems understanding the client's needs or problem | 1 | 4 | 25 | 10 | 4 |
| | 2.3% | 9.1% | 56.8% | 22.7% | 9.1% |
| Students rely on data that is easy to obtain (e.g., Internet or textbook data) | 0 | 3 | 13 | 18 | 10 |
| | 0.0% | 6.8% | 29.5% | 40.9% | 22.7% |
| Students use published or secondary data without judging its relevance to the client's context | 1 | 9 | 18 | 14 | 2 |
| | 2.3% | 20.5% | 40.9% | 31.8% | 4.5% |
| Students avoid collecting primary data (doing their own original data collection) | 4 | 18 | 5 | 12 | 5 |
| | 9.1% | 40.9% | 11.4% | 27.3% | 11.4% |
| Students use opinions of a single individual without verifying it against other data | 3 | 6 | 19 | 12 | 4 |
| | 6.8% | 13.6% | 43.2% | 27.3% | 9.1% |
| Students are overconfident about the value or accuracy of their personal knowledge | 1 | 6 | 21 | 11 | 5 |
| | 2.3% | 13.6% | 47.7% | 25.0% | 11.4% |

**Table 5.** Perceptions of student tasks between instructor experience levels (low and high).

**Survey item rated on 7-point Likert-type scale**

| Instructor perceptions of importance and student competence on the following: | | Low $n$ = 16 | High $n$ = 16 | $N$ | $t$ | $df$ | $p$ |
|---|---|---|---|---|---|---|---|
| Students review given facts or opinions to determine their weight or importance | Importance | 6.13 | 6.50 | 32 | −1.56 | 30 | .128 |
| | Competence | 5.31 | 6.13 | 32 | −2.73* | 30 | .010 |
| Students confirm that their project goals are adequately defined | Importance | 5.67 | 6.56 | 32 | −3.05** | 30 | .006 |
| | Competence | 4.80 | 5.75 | 32 | −2.21* | 30 | .035 |
| Students identify and consider the priorities of multiple stakeholders | Importance | 5.81 | 5.94 | 32 | −0.28 | 30 | .785 |
| | Competence | 5.06 | 5.56 | 32 | −1.55 | 30 | .131 |
| Students gather data or information that is useful to the project | Importance | 6.67 | 6.75 | 32 | −0.53 | 30 | .669 |
| | Competence | 5.80 | 6.13 | 32 | −1.14 | 30 | .262 |
| Students make recommendations that are based on information and data | Importance | 6.71 | 6.31 | 32 | 0.96 | 30 | .343 |
| | Competence | 5.50 | 5.81 | 32 | −0.72 | 30 | .481 |
| Students recognize and resolve contradictory information and opinions | Importance | 5.44 | 6.44 | 32 | −2.58* | 30 | .015 |
| | Competence | 4.19 | 5.69 | 32 | −3.29** | 30 | .003 |
| Students assess the reliability of information used in the project | Importance | 5.86 | 5.31 | 32 | 1.12 | 30 | .271 |
| | Competence | 4.43 | 4.81 | 32 | −0.77 | 30 | .447 |
| Students assess the relevance of published or secondary information for the client | Importance | 5.21 | 5.69 | 32 | −0.831 | 30 | .443 |
| | Competence | 4.07 | 5.53 | 32 | −3.28** | 30 | .003 |
| Students apply skill sets, principles, and methods that are relevant to the project | Importance | 6.27 | 6.69 | 32 | −1.79 | 30 | .083 |
| | Competence | 5.47 | 6.25 | 32 | −2.46* | 30 | .020 |
| Students use research methods that are appropriate for the project | Importance | 6.33 | 6.75 | 32 | −2.16* | 30 | .039 |
| | Competence | 5.33 | 5.75 | 32 | −1.03 | 30 | .309 |
| Students make recommendations that are specific enough to guide client's actions | Importance | 5.79 | 6.13 | 32 | −0.69 | 30 | .494 |
| | Competence | 5.15 | 5.56 | 32 | −0.88 | 30 | .387 |
| Students verify the accuracy of the assumptions they have made | Importance | 5.56 | 6.50 | 32 | −2.42* | 30 | .022 |
| | Competence | 4.31 | 5.44 | 32 | −2.93** | 30 | .006 |

**Table 6.** Perceptions of student judgment gaps between instructor experience levels (low and high).

| Survey item rated on 5-point frequency scale | Low n = 16 | High n = 16 | N | t | df | p |
|---|---|---|---|---|---|---|
| Students have problems understanding the client's needs or problem | 3.36 | 2.94 | 32 | 1.29 | 30 | .208 |
| Students rely on data that is easy to obtain (e.g. internet or textbook data) | 4.07 | 3.44 | 32 | 2.01 | 30 | .055 |
| Students use opinions of a single individual without verifying it against other data | 3.36 | 2.75 | 32 | 1.72 | 30 | .097 |
| Students use published or secondary data without judging its relevance to the client's context | 3.50 | 2.69 | 32 | 2.86** | 30 | .008 |
| Students avoid collecting primary data (doing their own original data collection) | 3.36 | 2.69 | 32 | 1.42 | 30 | .167 |
| Students are overconfident about the value or accuracy of their personal knowledge | 3.71 | 2.91 | 32 | 2.52* | 30 | .018 |
| Students are overconfident about the value of accuracy of information from the client | 3.50 | 3.38 | 32 | 0.38 | 30 | .711 |
| Students prefer qualitative parts of their projects more than the quantitative parts | 3.71 | 2.75 | 32 | 2.74* | 30 | .011 |
| Students maintain early ideas even if new information shows those ideas to be inferior | 3.07 | 2.44 | 32 | 2.78* | 30 | .010 |
| Students limit their data search and ideas to meet minimum standards rather than pursuing higher levels | 3.50 | 3.19 | 32 | 1.21 | 30 | .236 |
| Students create reports or recommendations without adequate research data | 3.14 | 2.50 | 32 | 2.35* | 30 | .026 |
| Students create generic reports or recommendations that are not client specific | 2.57 | 2.13 | 32 | 1.24 | 30 | .226 |

In subsequent exploration of the data, t tests were used to compare instructor groups formed by taking the lower and upper terciles of the experience variable. Per Table 5, reported level of instructor experience with student consulting did exhibit significant positive associations with several survey items. Of note were the items related to importance and student competence on tasks such as defining client goals and checking assumptions, as well as handling data conflicts, and assessing utility of secondary information. No major relationships were seen between instructor experience using consulting assignments and their perceptions of student control over a task or their prioritizing specific consulting tasks in the lesson plan.

The level of instructor experience with student consulting also interacted with perceptions of gaps in student judgment. Novice users of consulting projects reported higher frequencies of students displaying judgment gaps than did professed experts. This was true for all 12 gap items, but the following behaviors (related largely to perceptions of student effort) were significant (see Table 6):

- using published or secondary data without judging its relevance to the client's context
- being overconfident about the value or accuracy of their personal knowledge
- preferring qualitative parts of their projects more than the quantitative parts
- maintaining early ideas even if new information shows those ideas to be inferior, and
- creating reports or recommendations without adequate research data.

## Conclusion and recommendations

Although student consulting projects are not a panacea, we do believe that consulting projects require student critical thinking in ways that other educational processes cannot. Specifically, we have discussed three core consulting activities tied to critical thinking: evaluating problems, evaluating information, and evaluating assumptions. As consultants, students must sort through a welter of business information to separate the problem(s) the client is trying to overcome from those that are not central to the project. The difficulties begin when students must conduct interviews to begin understanding the client's needs. Often students are not knowledgeable enough to understand which client problems are critical and which are merely annoying. Students must build a purpose from diverse information gained about the company they are serving and about other relevant stakeholders.

The second thing that student consultants must do is to gather data to inform their subsequent approach and recommendations. This necessitates gathering data that are easy to find (i.e., from the internet or their textbooks) as well as somewhat more difficult to find published secondary data. In their data gathering, they will often need to collect their own primary data. Students need to verify that data are relevant to the problem they are trying to solve. Also, some of the data will likely be in conflict with other parts of the data. Some of the objective data may contradict what they have learned in an interview process with the client organization. So to make a consistent picture of the company and the problem they are trying to solve, they must evaluate all the various data sources and discount some of them based on some type of criteria. Finally, students must test their assumptions carefully before making any recommendations to the client.

However, one cannot assume that students automatically gain critical thinking skills from student consulting projects. We must first decide what behaviors are required and then try to structure the consulting experience so that maximum development occurs. As suggested by previous authors (e.g., Brookfield, Citation1987; Grossman, Citation2002; Halpern, Citation1999)

requiring students to reflect on their judgment processes. It is more than likely that students are influenced by what faculty either overtly or covertly pay attention to during consulting projects. The items in Table 3 offer an example of how to operationalize critical thinking competencies into a set of behavioral statements that can be embedded in an instructor's rubric for assessing student consulting work.

In terms of the relative importance of various student behaviors, this study shows that faculty expect students to apply relevant skill sets, models, and research methods; they also consider data gathering and making data-driven recommendations to be important aspects of student consulting. We do find a potential experience divide on the part of faculty, in that advanced users of consulting seem to focus on evaluating information for fit, accuracy, and reliability and synthesizing various or conflicting sources of information a bit more than novices do. This implies that not all faculty using the consulting method are challenging students to engage with the highest levels of Bloom's taxonomy.

In Table 4, we have presented relevant judgment gaps that may be conceptually linked with the three critical thinking dimensions explored in this study. Thus, we provide useful vocabulary that instructors can employ in systematically verbalizing their observations about student gaps to students and to other faculty. Faculty ratings on these items also indicate that students apply heuristics or bounded rationality when handling information and that students demonstrate misguided judgment, often based on single sources of information. We noted that students have difficulty making judgments about the similarity of client context and the context in which secondary data was collected or meant to be used. We additionally see that students can be swayed by the illusion of client or personal authority, and in the absence of personal motivation or gentle instructor prodding, likely will base decisions on that questionable authority rather than triangulate information with alternate evidence.

Interestingly, again there is a difference between self-professed experts and novices in that the novice faculty users of consulting projects seem to find more fault with their students' judgment across the surveyed gap items. This suggests that perhaps novice users view consulting as a set of prescribed testable activities which students fail or not, whereas the expert users of consulting are more engaged with social aspects of client relationships and managing clients and students to achieve negotiated outcomes.

Nonetheless, we do believe strongly that many of the portrayed judgment gaps can be ameliorated through increased attention to good research methods practices, particularly in terms of understanding sample size and concepts of data validity and reliability. Holler (Citation2010) was clear about the potential role of the university librarian in this situation, stating that "during the search process, librarians can help students understand what conclusions can and cannot reasonably be drawn from information based on the authority, accuracy, timeliness, and bias of the resource [Holler, Citation2009] and can guide the students in locating corroborating information" (p. 228). Kumcu and Kumcu (Citation1998) went further by suggesting that librarians be assigned an active role in the consulting project to assist student consultants as the students seek information to support their business projects.

**Limitations and future research**

This study serves to direct attention to conceptual linkages between student consulting tasks and critical thinking with a focus on human judgment behavior. No attempt is made to infer conclusions or causal relationships. Although it is also unknown to what extent the specific parameters of client

setting influenced the students' judgment behaviors, we believe some types of satisficing and heuristic behaviors may replicate across most types of projects, as the faculty experts were from a variety of business disciplines and institutions.

      Future researchers can explore the various roles of important actors in the consulting project (i.e., the student, the client, and the faculty member). Given that present findings suggest a possible positive association between faculty experience with consulting and their ratings on importance, student competence, and frequency of student judgment gaps, hypotheses may be constructed to examine these relationships more in depth.

      We are also interested in further understanding how bounded rationality may be situationally driven, such as instances where relevant information is scarce. Other factors to be addressed are the consequences of absent critical thinking on the outcomes of the project (i.e., the effects of poor information handling on financial projections or the viability of recommendations offered to the client).

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