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EFFECTS OF ARGUMENTATION PROMPTS ON ALTERNATIVE POSITIONS
IN ILL-STRUCTURED PROBLEM-SOLVING

by

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ABSTRACT

EFFECTS OF ARGUMENTATION PROMPTS ON ALTERNATIVE POSITIONS IN ILL-STRUCTURED PROBLEM-SOLVING

Chrysoula Malogianni
Old Dominion University, 2019
Director: Dr. Tian Luo

Little is known about the role of prompts to help learners solve ill-structured learning problems. Instructors do not devote adequate time to formulate pedagogically useful prompts, and the usefulness of different types of prompt is unclear. The question of whether prompt variation can generate superior argumentative depth has not been resolved. This mixed-methods study, using quantitative and qualitative data collected from 32 students, examined the role of argumentative prompts in the writing of essays based on business case studies. The research questions were: Is there a significant relationship between the type of argumentative prompt and argumentative depth? Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth? How are types of argumentation strategies utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts? A significant ($p < .001$) relationship with a large effect size was found between the type of argumentative prompt (rhetorical and dialectical) and argumentative depth. Alternative argumentative positions were found to significantly ($p < .001$) mediate the relationship between argumentative prompt type argumentative depth with a large effect size. Verification and elaboration strategies were utilized in a similar way across both rhetorical and dialectical prompts. Dialectical prompts did not appear to be more effective than rhetorical prompts when using the evidence strategies. Rebuttal appeared to be utilized more in response to dialectical prompts. The implications are that instructors should ensure that both

rhetorical and dialectal prompts are provided in assignments involving ill-structured learning problems.

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This dissertation is dedicated to my daughter, Anastasia. You have made me stronger, better, and more fulfilled than I could have ever imagined.

You may see me struggle, but you will never see me quit.

I love you!

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CHAPTER I

INTRODUCTION

Educators need to have well-designed instruction and to avoid ill-planned instructional problems (Simon, 1973). This requires an early and seminal discussion of the nature of and differences between these kinds of instructional problems. Well-structured problems are those in which all the necessary components for problem solving are correctly and unambiguously available to the students (Cheng & Siow, 2015; Simon, 1973). The classic example of a well-structured learning problem is an applied mathematics problem because these exercises have verifiable answers (Reed, 2016; Simon, 1973).

Ill-structured problems are those concerning complex real-world situations with undefined parameters and without a definitive solution. Often these also have an underlying ambiguity (Collins, Sibthorp, & Gookin, 2016). Despite a scholarly consensus regarding such ill-structured problems and despite their sometimes being solvable, there is no binary, right-wrong set of solutions within these ill-structured problems (Byun, Lee, & Cerreto, 2014; Collins et al., 2016; Gallagher, 2015).

One commonly recognized factor that has contributed to the quality of solutions for ill-structured problems has been the depth of argumentation applied to these problems, a term that refers to the ability to argue effectively from multiple sides of the issue (Oh & Jonassen, 2007). This definition of the depth of argumentation contains two components: the effective use of multiple types of argumentation, and a reflection of multiple positions with respect to the issue. Both these components are necessary to understand the mechanics of solving ill-structured problems. First, an argument must be effective via the use of multiple types of argumentation.

The four types of argumentation are verification, rebuttal, evidence, and elaboration, although other definitions of effective argumentation exist (Oh & Jonassen, 2007). Second, an argument must reflect different positions, or alternative positions in a phrase used by other researchers (Asterhan & Schwarz, 2016; Özdem Yilmaz, Cakiroglu, Ertepinar, & Erduran, 2017; Verberg, Tigelaar, & Verloop, 2015).

For example, a business student might demonstrate these skills by their ability to create evidence-based arguments, or well-connected supportive claims derived from evidence via premises. Such communication skills and evidentiary support for ideas presents an important aspect of the characteristics of the business inquiry process. This process provides a mechanism to evaluate business claims and make good case studies for this research (Morikawa, 2017).

Pragmatically, the best way to assist students in developing business-related and evidence-based arguments is to engage them in argumentation learning tasks in a business class. Additionally, recent studies have shown a shift from the traditional pedagogical roles in which the professor lectures and the students passively take notes (Corno and Snow, 1986; Sternberg, 1997). Instead, classes more often make use of problem- and student-centered instruction (Gonzales & Nelson, 2005).

The advent of online education and the advancement of educational technology now challenge academic instruction in new ways that can provide an effective mechanism for teaching effective argumentation (Crowe, LaPierre & Kebritchi, 2017). Such technologies applied to either singular or interdisciplinary courses have changed how social constructivists view experiences, personal interactions, observations, and reflections as cultural statistics. Such social constructs are based on the participants' as well as practitioners' cultural thought patterns, concepts, and categories of social connections (Adler, 1991; Adler, 2001). In addition, the

cultural constructivist approach that elevated those competencies can lead to cultural intelligence. Cultural intelligence in turn plays a key role as a latent construct in the development of cross-cultural competence for enabling effective instruction that aligns to student argumentation across a variety of academic courses (Winn, 2013).

The use of prompts can positively affect the subsequent quality of solutions to ill-structured scholastic problems (Oh & Jonassen, 2007). Prompts are of considerable interest in the instructional literature because ill-structured academic problem solving tends to occur in specific pedagogical contexts in which instructors use prompts for both guiding and priming student responses (Cooper & Oliver-Hoyo, 2016; Harney, Hogan, & Quinn, 2017; Kern & Crippen, 2017). By its nature, an ill-structured problem does not contain an implicit question, and thus prompts are necessary (Byun et al., 2014; Huang, Chen, Wu, & Wei-Yu, 2015). For example, a well-designed problem, such as the algebraic problem $4a + 7 = 31$, contains its own implicit question, and does not require a prompt.

However, ill-structured academic problems contain many details, facts, and perspectives, and do not always contain an explicit question within themselves (Byun et al., 2014; Huang et al., 2015). In this context, prompts are necessary to guide student engagement when confronted with an ill-structured problem learning task (Byun et al., 2014; Huang et al., 2015). However, even when ill-structured problems contain easily discernible questions, prompts are still important, because they are capable of engaging student cognition in a manner that potentially results in a better solution to the problem (Byun et al., 2014; Huang et al., 2015). A prompt begins the process of thinking and, more specifically, orients students towards the perspectives, processes, and approaches necessary to achieve true depth in their solutions (Byun et al., 2014; Huang et al., 2015).

One of the main types of prompts in the literature is the argumentative prompt (Liu & Stapleton, 2014; O'Hallaron, 2014; Polio & Shea, 2014). Argumentative prompts take two basic forms: rhetorical (Qin & Uccelli, 2016) and dialectical (Stapleton & Wu, 2015). While not mutually exclusive, the dialectical form often lends support to the rhetorical methodology (Yoon & Polio, 2017). From the context of an ill-structured problem, a rhetorical argumentative prompt directs the person to think more deeply as they work on a solution as well as to write in order to convince the reader (Qin & Uccelli, 2016). In this same context, a dialectical argumentative prompt specifically encourages the student to consider different perspectives and points of view as they engage in the solution process (Stapleton & Wu, 2015). Ultimately, the purpose of both rhetorical and dialectical argumentative prompts is the same—to improve the chances that problem-solvers will achieve argumentative depth in their proposed solutions to an ill-structured problem (Liu & Stapleton, 2014; O'Hallaron, 2014; Polio & Shea, 2014; Qin & Uccelli, 2016; Stapleton & Wu, 2015; Yoon & Polio, 2017).

However, despite having a common purpose, these two types of prompts are very different in structure. Both instructors and instructional designers face the challenge of whether specific argumentative prompts affect the depth of the applied argument and whether such prompts affect the quality of a solution generated to an ill-structured problem. An important accompanying question is whether argumentative prompts generally succeed at improving student arguments and solutions, particularly when multiple alternative positions exist. Limits to the pedagogical instructional approach also correlate to the larger rhetorical interest of how to teach and measure the quality of a student's argument in answering the research questions of this proposal (Dali, Lau, & Risk, 2015).

Problem solving is a multifaceted and complex cognitive process for resolving different types of novel or non-familiar issues. These cognitive processes call on different skills, having required that these skills be taught through different instructional/learning methods (Baars, Van Gog, de Bruin, & Paas, 2017; Shute, Wang, Greiff, Zhao, & Moore, 2016; Timmers, Walraven, & Veldkamp, 2015). Instructional problem-solving varies in several ways along a continuum between well-structured (Cheng & Siow, 2015; Reed, 2016) to ill-structured learning tasks (Byun et al., 2014; Collins et al., 2016; Shin & Song, 2016).

Literature reviews from the previous century have suggested that the process of solving ill-structured problems is largely the same as that of solving well-designed problems (Simon, 1978). Various more recent research findings distinguish between the cognitive skills required for ill-structured instructional problems and well-structured ones (Byun et al., 2014; Collins et al., 2016; Gonzales & Nelson, 2005 Kern & Crippen, 2017; Lazarou et al., 2016; Timmers et al., 2015). Argumentation applied in academic problem solving not only is essential but also demonstrates the acquisition and learning of problem-solving skills in every discipline (Asterhan & Schwarz, 2016; Condit, 1994; Cooper & Oliver-Hoyo, 2016; Liu & Stapleton, 2014; Özdem Yilmaz et al., 2017; Tawfik, 2017; Zorwick & Wade, 2016).

Argumentation is an activity in which students attempt to decrease or increase the acceptability of one or more ideas via cognitive reasoning (Baker, 2002, 2003; Walton, 2006). Asternhan & Schwarz (2016) argued that argumentation is essential in learning because it requires intentional attempts at inducing learners' conceptual change. The applicability of the problem-solving skills demonstrates the objectification of perspectives and their representation by the individuals who had defended them. In addition, argumentation is the means for rationally

resolving conflicts and is central to scientific thinking (Lazarou et al., 2016; Liu & Stapleton, 2014; Özdem Yilmaz et al., 2017; Tawfik, 2017; Zorwick & Wade, 2016).

Theoretical Overview

Cognitive flexibility theory (CFT) was developed as a response to the inadequacy of Glaser's (1984) schema theory in ill-structured problem solving (Spiro, Collins, Thota, & Feltovich, 2003). Schema theory failed because for ill-structured problems pre-packaged schemas typically did not exist for all possible contexts and novel situations characteristic of these problems. Even though many researchers from different domains showed a keen interest in using case methods to improve student learning, few understood how to best structure and integrate case analysis to achieve suggested potential benefits (Bergstrom et al., 2016; Spataru et al., 2016). This failing was especially important to increase critical thinking and problem-solving skills related to real-life decision-making (Bergstrom et al., 2016; Spataru et al., 2016).

Case-based approaches did not present alternative perspectives, but potentially did provide the opportunity to re-experience problems from different perspectives and examine multiple facets of each situation (Spiro et al., 2003). Experience with multiple cases thus was the basis for learning via reasoning over ill-structured problems and developing a case library of problem-solving experiences (Bergstrom et al., 2016; Spataru et al., 2016).

In contrast, CFT is a constructivist and context-dependent theory of learning and instruction developed to help people learn a complex subject matter or acquire advanced knowledge, transfer this knowledge beyond their initial learning situation, change their epistemological beliefs, and develop hypermedia learning environments in support of these goals (Spiro et al., 2003). Those hypermedia learning environments are cognitive flexibility hypertexts

(CFHs). CFHs provide a nonlinear and multi-dimensional organization of materials using cases (Bergtrom et al., 2016; Spataru et al., 2016).

CFHs do not follow a linear organization that builds from simple to complex, as in traditional instructional approaches suited for well-structured problem solving. Rather, they provide different facets for each case having been based on the crisscross metaphor recommended by CFT (Spiro et al., 2003). Research on CFHs has not been extensive, but findings do support their effectiveness in ill-structured student-centered problem-solving domains (Godshalk, Harvey, & Moller, 2004; Harvey, Godshalk, & Milheim, 2001; Jacobson & Spiro, 1994; Jonassen & Grabinger, 1993; Strobel, Jonassen, & Ionas, 2008). At the same time, CFT cases provide a model for instruction for ill-structured problem solving via presentation of multiple perspectives in problem-solving argumentation (Godshalk et al., 2004; Harvey et al., 2001; Jacobson & Spiro, 1994; Jonassen & Grabinger, 1993; Strobel et al., 2008).

In the current project, CFT provides the underlying structure that supports the study. Varying types of cues offered in several case studies will stimulate student argumentation responses. An analysis of those responses allows an in-depth exploration of types and frequencies of argumentative cues compared to the depth of argumentative responses. In addition, a more qualitative assessment of how individuals make use of cues in constructing their argumentative responses will provide greater depth of understanding of CFT in the development of argumentation.

Subjective analysis of the use of CFT / CFH in this study does not imply any specific prediction about the superiority of either rhetorical argumentative prompts or dialectical argumentative prompts in terms of eliciting superior argumentative depth. Rather, the CFT provides a theoretical framework with an emphasis on case studies that offer an appropriate

means for eliciting and measuring argumentative depth as part of a solution to an ill-structured academic problem.

Literature Review

In the collaborative student-centered learning atmosphere, research shows that every member of a learning team must offer credible arguments, offer defensive logic with supportive approaches and keep an open mind. In addition to these characteristics of problem-solving and student-centered learning, research supports the pragmatic application of the major theories fundamental to the processes of teaching and problem design as learning tasks for students (Lefstein, 2018). The literature review section contains information regarding prompts in argumentation, the complexity of the problem, and using case studies to teach argumentation.

Prompts in Argumentation

An ill-structured problem has been defined as one in which one or more aspects of the problem were not well defined or described, and the problem thus requires knowledge other than that contained in the problem description (Xu & Land, 2006). Solving such problems in both learning and work environments often requires skills of collaboration and quality interactions (Harney et al., 2015). Such ill-structured problems have also generally required different conceptual solving processes. An instructional technique designed to achieve the needed problem-solving and collaboration skills was providing students with prompts as part of scaffolding protocols designed to elicit appropriate responses (Harney et al., 2015). Harney et al. (2015) noted that a prompt in this context might consist of many forms, including guiding questions, hints, clues, sentence openers, and so on. Prompts also might be either task-level prompts that focused on specific tasks or elements of a problem, or process-level prompts that encouraged the student to take a broader process-oriented view of the problem (Harney et al.,

2015). Harney et al. (2015) measured perceived and objective consensus in solving ill-structured problems, the argumentation styles used in responses to the problems, and the argumentation complexity developed by two groups of students, one that received task-level prompts, and the other that received both task- and process-level prompts. These researchers found that process-level prompts produced greater reflection and deliberation, increased overall collaboration, greater consensus, and improved self-efficacy within the group (Harney et al., 2015).

The rationale for using prompts to elicit higher quality student responses has been based on the inherent ambiguity of essay-type problems that may result in the student producing a response that is outside the boundaries of instructor expectations (Miller, Mitchell & Pessoa, 2016). For example, Miller et al. (2016) studied essay assignments in a university-level introductory world history course. The researchers found that student responses varied in type, including historical accounts that presented a what-happened-when timeline presentation; explanations that defined why events happened as they did; descriptive reports that merely described the subject of the essay; and arguments that presented discussions for and against a single overarching theme. Miller et al. (2016) found that the wording of the essay question acted as a prompt for specific types of responses from the students. Questions asking for facts such as, “what happened...” and “why...” most often resulted in historical account responses and explanation responses, while rhetorical prompts asking for opinions such as, “do you think...” triggered argumentative responses (Miller et al., 2016). Dialectical prompts such as “compare and contrast...” or “what advantage did X have over Y...” similarly produced argumentative responses. The key conclusion of this study was that prompts were most effective when they clearly defined the instructor’s expected genre of response (Miller et al., 2016). The intertextual

relationship between the question prompts, the source texts available, and student writing was a critical element in defining both the quality and type of student responses (Miller et al., 2016).

Evidence also indicated that the use of prompts improved the quality of responses to ill-structured problems (Xun & Land, 2006). Prompts provided the necessary scaffolding on which students could structure responses to such problems. Xun and Land (2006) constructed a scaffolding framework that used question prompts to direct attention to important aspects of the problem at hand. Despite the importance of the question prompts in providing the necessary problem-solving scaffolding, they are not always successful at guiding responses in appropriate directions (Xun & Land, 2006). In part, this sometimes was due to lack of students having the assumed prior knowledge, or lack of attention of the student to the prompt during the problem solving process (Xun & Land, 2006). Xun and Land (2006) found that an argumentation prompt combined with either peer or instructor interaction was more effective than prompt alone at overcoming those issues and providing students with the needed scaffolding in ill-structured problem solving.

The Complexity of the Problem

Instruction is particularly complex because it entails multiple conflicting goals and demands (Lefstein & Snell, 2014; Lefstein, 2018). In addition, instruction is an uncertain process because it deals with students who have individual opinions and attitudes (Lefstein & Snell, 2014; Lefstein, 2018). To increase the complexity of instruction, teachers must constantly adapt and respond to spontaneous and non-routine situations in the classroom (Lefstein & Snell, 2014; Lefstein, 2018). To achieve this complicated set of skills, instructors must notice when unexpected situations arise, must have a broad range of strategies and expertise, and have

sufficient professional judgment to determine the most appropriate responses for each situation (Lefstein & Snell, 2014; Lefstein, 2018).

Oh and Jonassen (2007) completed a quantitative study designed to measure, among other relationships, the connection between constraint-based argumentation scaffolds and the quality of the argumentation. Earlier, Cho and Jonassen (2002) confirmed that constraint-based argumentation scaffolds were effective for increasing the generation of arguments especially with ill-structured problems. Although Cho and Jonassen (2002) did not use the terminology of rhetorical or dialectical prompts, Oh and Jonassen (2007) analyzed the prompts established in the prior study, leading them to confirm that the prompts used in 2002 were valid and reliable. For example, one of the prompts used in Cho and Jonassen (2002) asked for alternative solutions and another prompt asked why the learner did not agree with the argument. Therefore, Oh and Jonassen (2007) determined that it was appropriate to consider data from that earlier study as an example that has substantiated the effect of prompt types on argumentation in learners' problem-solving tasks.

Oh and Jonassen (2007) determined that, in their 2002 study, they did not measure the depth of the argumentative process but instead measured the relationship between instructional problem-solving prompts and the use of four types of argumentation—rebuttal, verification, elaboration, and evidence. The implications of Oh and Jonassen's (2007) findings have helped educators, instructional designers, and educational researchers gain a better understanding of the extent to which variations in prompt types may potentially influence the variation in the frequency of argumentation types.

Depth of argumentation and prompts.

Nonetheless, one of the main concerns of educators has been about the depth of argumentative essays. The literature has not addressed the important question of whether prompt variation can elicit superior argumentative depth. In addition, Oh and Jonassen (2007) did not formally differentiate their prompts in accordance with the rhetorical / dialectical bifurcation. Oh and Jonassen (2007) incorporated in the methodology categories such as problem identification and solution generation. These categories, while containing examples of rhetorical and dialectical prompts within them, were not necessarily of practical use to educators who needed general guidance about what kind of prompts best elicited an effective argumentative depth in response to ill-structured learning problems.

Golanics and Nussbaum (2008) completed a quantitative study designed to measure the effect of two kinds of prompts—elaborated and unelaborated prompts, on the dependent variable of an argumentative balance. As defined by Golanics and Nussbaum (2008), the dependent variable of argumentative balance contained elements of what Deans (2017) defined as argumentative depth and with elements of what Oh and Jonassen (2007) defined as an argumentative type. Due to the idiosyncratic nature of Golanics and Nussbaum's (2008) dependent variable, it was not possible to compare these study results to other results in the literature, notably those of Oh and Jonassen (2007). However, the usefulness of Golanics and Nussbaum's (2008) study was its identification of a substantial effect of the prompt on resulting components of argumentative quality, regardless of how these components were defined.

Golanics and Nussbaum (2008) found that the argumentative balance of essays written in response to elaborated prompts was several times larger than the argumentative balance of essays written in response to unelaborated prompts. This finding suggested that prompts can be of high

value in priming learners as writers to produce texts that contain argumentative depth as well as multiple forms of argumentation. However, Golanics and Nussbaum (2008) did not elaborate on defining their prompts in useful ways. It is likely that many educators already use elaborated prompts.

What educators needed was not merely evidence of why prompts have worked better than no prompts in terms of eliciting higher-quality responses to ill-structured problems—but more specific guidance about which kinds of prompts might be more useful. Golanics and Nussbaum's (2008) study did not provide this kind of information. Oh and Jonassen's (2007) study contained examples of different kinds of prompts, but without classifying these prompts as either rhetorical or dialectical. Thus, the study by Golanics and Nussbaum (2008) as well as that by Oh and Jonassen (2007) both failed to operationally define argumentative prompts in a manner specific enough to be of use in a practical educational setting. In addition, neither study measured the dependent variable of argumentative depth, although argumentative depth was apparently included within the construct of argumentative balance used by Oh and Jonassen (2007).

Using Case Studies to Teach Argumentation

These concepts are important in the proposed study because they provide a concentrated viewpoint regarding a phenomenon. This means that the study can be conducted with greater depth, allowing for more effective resolution. In cases where there is a lack of prior experience, experience in solving a related case has potential to facilitate solution finding in the ill-structured problem through exposing the team or students to alternative perspectives. Through a quasi-experimental study concurrent with mixed methods designs, researchers asked 68 participants to self-evaluate at the end of the study (Stark, 2013). Sixty-four of the participants completed all levels of the problem and 58 also completed the self-evaluation report. The remaining six did the

think aloud protocol. Following the research, the findings showed that all participants could solve basic, structured questions without the help of scaffolding support. They were able to make evaluations and justifications and develop problem solutions. Most students who provided the highest quality solutions were those who used scaffolding from cues and who listened to alternative potential solutions (Stark, 2013). These findings indicate that in business, there is a constant change in the argument and question structure given the differing situations. This may result from the generic strategy implemented in business competition focusing on development and growth, and how to achieve this with persuasive problem-solving (Reave, 2002).

Purpose of the Study

Ill-structured academic problems are ubiquitous in many learning environments, including business, law, medicine, psychology, education, and humanities. This has been substantiated by research (Byun et al., 2014; Collins et al., 2016; Gallagher, 2015; Riis et al., 2017; Shin & Song, 2016). In these domains and others, instructional problems often appear as case studies to which a student is asked to respond (Bergstrom, Pugh, Phillips, & Machlev, 2016; Spataru, Winsor, Simpson, & Hosman, 2016). Some combination of instructional designers, domain experts, and teachers typically design these ill-structured learning problems (Byun et al., 2014; Collins et al., 2016; Gallagher, 2015; Riis et al., 2017; Shin & Song, 2016). Historically, a great deal of practical effort has been devoted to the creation of ill-structured teaching problems, and the design of such problems has also been subject to considerable academic research (Byun et al., 2014; Collins et al., 2016; Gallagher, 2015; Riis et al., 2017; Shin & Song, 2016).

There is less research addressing the role of prompts in ill-structured learning problems. Often, teachers do not devote the necessary time to the formulation of pedagogically useful prompts (Liu & Stapleton, 2014; O'Hallaron, 2014; Polio & Shea, 2014; Qin & Uccelli, 2016;

Stapleton & Wu, 2015; Yoon & Polio, 2017). Furthermore, researchers have also failed to examine the usefulness of certain instructional prompts in comparison to others.

In the absence of such information, teachers in any domain in which ill-structured problems exist lack the appropriate guidance about how to present an ill-structured lesson to their students. The ultimate consequence of this lack of knowledge is that students might fail to achieve the depth of ability of argumentation that they might attain with the guidance of the correct prompt. This in turn reflects the possibility that such students will enter the workforce with suboptimal argumentative or thinking skills. This study thus will focus on the effect of argumentation prompts, their depth, positions, and types in ill-structured teaching domains.

Research Questions

Employees and management need to have the right skills to adapt to the situations and derive a problem-solving solution through the application of differentiated approaches. Therefore, this study explored the effects of different argumentation prompts in case studies. The research questions were:

RQ1: Is there a significant relationship between the type of argumentative prompt and argumentative depth?

RQ2: Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth?

RQ3: How are types of argumentation strategies (including verification, rebuttal, elaboration, and evidence) utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts?

CHAPTER II

METHODOLOGY

Research Design

The research design for this study was that of a mixed methodology. This was mainly to address different question types. Both quantitative and qualitative methods were appropriate at all levels of the study: data interpretation, data analysis and data collection and design.

The study addressed two quantitative research questions (RQ1 and RQ2) and one qualitative research question (RQ3). The first two research questions were quantitative because of (a) their ontological assumption that argumentative depth can be measured and (b) their utilization of statistical procedures. The study was post-positivistic in that the assumption about the objective measurability of argumentative depth is a methodological assumption, not a reflection of reality. In fact, the qualitative portion of the study, the investigation of research question RQ3, drew upon an assumption that argumentation is what McNabb (2010) described as part of “multiple, subjectively derived realities [that] coexist” (p. 225). Because the study approached the phenomenon of argumentation from both quantitative and qualitative assumptions, it was mixed-methods in design.

The specific mixed-methods design of the study was concurrent triangulation (Creswell & Plano Clark, 2011; Ivankova, Creswell, & Stick, 2006). The quantitative and qualitative portions of the study addressed the phenomenon of argumentative depth from different, partially complementary perspectives. The quantitative portion of the study focused on (a) the extent to which different types of argumentative prompts might be more effective in terms of generating argumentative depth (RQ1); (b) the possibility that frequency of alternative positions mediates the relationship between argumentative prompt type and argumentative depth (RQ2); and (c) the

ways in which differences and similarities in argumentative type appear in responses to rhetorical argumentative prompts versus dialectical argumentative prompts (RQ3).

Focus areas for RQ1 (the extent to which different types of argumentative prompts might be more effective in terms of generating argumentative depth) and RQ3 (the ways in which differences and similarities in argumentative type appear in responses to rhetorical argumentative prompts versus dialectical argumentative prompts) were conceptually related, in that variation in the types of argumentation (verification, rebuttal, evaluation, and evidence) might be responsible for the greater argumentative depth of essays produced in response to either rhetorical argumentative or dialectical argumentative prompts. The possible relation between focus areas (a) and (c) suggested that the specific design of the quantitative methodology of the study was concurrent triangulation.

The instructional materials for the study consisted of three business cases followed by three different prompts. The first was no prompt and did not give any direction to solve the designated problem. The second was a rhetorical prompt that asked the use of persuasion argumentation for problem-solving such as taking a yes or no position on whether effective business leadership is transformational and why. The third was a dialectical prompt that asked a question such as how business team collaboration generates innovative problem-solving. All participants read the same cases; then, based on the randomization procedures noted earlier, each was asked to respond to the prompts in the sequence associated with their group assignment. The chosen cases are available from the Yale School of Management Case Studies. The chosen cases are free and open for use, so requesting permission to use them in this study was not required.

Participants

The participants consisted of two sections of the same Essentials Business course for a Hybrid MBA program. The two sets of participants were students enrolled in two different sections of that course that were conducted at the same time and with the same instructor. Both sections' participants worked online. Each of the two sections had 22-24 students. The experimental procedure was applied in the context of teaching the business school discipline, to students enrolled in a hybrid Master of Business Administration (MBA) program at an accredited higher education institution in the United States.

Student demographics in this course varied from adults in the 25 to 40 year-old age range with mid to low levels of actual work experience, and a few adults with more than 7 to 10 years' work experience. To participate in this study, students were required to be taking the course for the first time.

MBA students were chosen for this study because they are trained in strategy, which makes them different from other possible participants. This meant that this population may yield different responses than other populations due to the nature of their study.

MBA students are unique in that they have been working on strategic decision-making in their real-life professional experiences. They have encountered challenges in business and are aware of the need to mitigate risks and make strategic decisions to the best of their knowledge. Strategic decisions need to be evaluated before they are implemented and argumentation is the blueprint for building reasoning skills and understanding the perspectives of others. Strategic decision making is an advanced cognitive task that requires the manager to process a large amount of information, field knowledge from past experiences and training, and engage in an unidentifiable set of cognitive activities and tasks, that usually includes analyzing past strategic

decisions and managerial histories, and reflecting on their own decision-making records (Bukhszar & Connolly, 1988). The strategic decision-making component of the MBA program was related to argumentation because when making strategic decisions, it is necessary to defend these decisions by a detailed process of reasoning in a manner that shows how to support an idea and understand the argumentation practices of others (Brockriede, Trapp, & Scheuetz, 2006, p. 87.)

Measures

Appendixes A, C, and E contain the business cases used in this study, representing the ill-structured problems, to which all the prompts apply. Appendixes B, D, and F contain the prompts themselves, which represent the interventions of the study. Appendix G contains the rater scale designed to measure argumentative depth (as the sum of points awarded to rubric items 1-5).

Prompt Type

The prompt type is the type of argumentative prompt (independent variable in RQ1 and RQ2). The prompts for the business cases are in Appendixes B, D, and F. For each case study (in Appendixes A, C, and E), the prompt types were dialectical, or rhetorical, or no prompt. For example, for the first case study in Appendix A, the dialectical prompt was, “In 2009, SELCO was looking at several options for expanding its operations (i.e. geographical expansion, serving poorer segments of the population, product-line extension). What are the costs and opportunities associated with each option? Which direction(s) would you recommend to Hande as the most promising? Consider the arguments for and against all alternative options;” the rhetorical prompt was, “Do you agree with SELCO’s approach to marketing? If you were the VP of Marketing,

how would you recommend that SELCO improve its efforts?” and the no prompt was, “Discuss what you believe to be salient in this business case.”

Argumentative Depth

Argumentative depth, the dependent variable in RQ1 and RQ2, was measured using a rater scale, provided in Appendix G. The argumentative depth was computed as the sum of the points the rater awards to rubric items 1 (unsatisfactory) through 5 (excellent) on that scale. Items 1 through 4 on the rater scale assessed how well the participants constructed verification, rebuttal, elaboration, and evidence argument types in their responses. Item 5 assessed the overall structure of the paper. The work of Deans (2017) informed the design of the rating rubric in Appendix G.

Frequency of Alternative Positions

The frequency of alternative positions, the mediator in RQ2, was a ratio variable with a lower bound of 0 (if no alternative positions were considered within a response) and no theoretical upper bound. If a response included both a “pro” and “con” position with respect to a specific topic, that response had two alternative positions. A paper that included two distinct “pro” positions and two “con” positions possessed 4 alternative positions in total. The frequency of alternative positions is the number of arguments discerned by the raters’ evaluation.

Argumentation Type

The argumentation type consisted of four sub scores on types of argumentation, determined from the rater rubric in Appendix G. The argument types of verification, rebuttal, elaboration, and evidence were scored quantitatively as part of the generation of an overall argumentative depth score, based on the rubric presented in Appendix G, but they also informed the qualitative portion of the study. As part of the data analysis for RQ2, the presence and

specific utilization of the argument types was compared across (a) the no-prompt condition, (b) the rhetorical prompt condition, and (c) the dialectical prompt condition. Verification, rebuttal, elaboration, and evidence were identified and coded in the qualitative data based on the detailed guidance provided by Oh and Jonassen (2007). The Oh and Jonassen (2007) data analysis process consisted of several analysis steps. The first step was to identify any missing values in the data and test for linearity. Oh and Jonassen (2007) identified an effect on their combined dependent variables of argumentation scaffolds at 5.99, $p < 0.01$ (Oh & Jonassen, 2007). In addition, Oh and Jonassen (2007) addressed the issue of interrater reliability. Their study specifically noted that the use of simple percentage for agreement could provide misleading measures that overestimated agreement among raters. The interrater reliability using their scheme was good ($d = 0.81$).

Validity of the Study

The internal validity of the study was improved by use of a random assignment procedure, to control for the possible effects of time as determinants of improvements in argumentative depth. The randomization procedure raised the chances that any detected effects of prompts were genuine and not the results of either the passage of time or statistical error. The construct validity of the study was improved by using Deans' (2017) rubric for measuring argumentative depth in economics essays, which were closely related to the business essays that were generated in this study (as a response to business cases).

Reliability of the Study

The reliability of the study required inter-rater correlation measurement. This rubric consists of ten specific items each judged on a scale of 1 (unsatisfactory) to 4 (excellent), giving a score range of 4 to 40. The items in Deans' (2017) rubric included a meaningful title; an

objective that addressed the topic and is appropriate in scope; development of the paper with adequate coverage in depth and breadth; a structure of the paper with logical sequencing and transitions; a conclusion that connects the topic to key points; appropriate use of sources; appropriate language and prose style; correct grammar, spelling, and mechanics; accurate citations; and a holistic overall rating of the quality (Deans, 2017). Deans' study considered groups of papers in a variety of fields from animal science, allied health, economics, and nutritional sciences. The mean and median scores of papers in Deans' study varied considerably across those four fields, depending in part on the sets of reviewers used in each field. Deans (2017) drew key conclusions including that usage of the rubric should not rely on a single rater; the averaged responses of 2 to 3 independent raters were more likely to yield a reliable estimate of the true argumentative depth of a given essay. The actual rubric used in the current study was based on Deans' but tailored to the specific research questions of this study. Appendix G defined the variation on Deans' rubrics used in this study.

Also, in terms of internal validity, it was necessary to blind the essays so that the raters were not aware of whether these essays were produced based on the no prompt condition, the rhetorical argumentative prompt condition, or the dialectical argumentative prompt condition. Such blinding occurred through the electronic transmission of the essays. The data collection procedure described earlier in the chapter explained how submissions will be blinded. Such blinding will reduce the likelihood of rater bias, which could occur if raters have conscious or unconscious motivations for rating essays produced in response to a specific prompt type more highly.

The use of pre-written business cases, like in SELCO (Yale School of Management, 2018), addressed the extant issues of reliability and validity. The prompts were created with the

intention to inspire solutions that were well argued and had sufficient depth, to develop designing solutions that would go both “deeper” and “wider” beyond the current standards. As a case, SELCO was considered to have a valid exigence, given that it contained the kinds of details and data that can inform essays written by management students, to inspire rhetorical thought and argumentation.

A researcher-designed case would have to undergo a process of content and construct validation but in the presence of existing cases, such as SELCO, this was unnecessary. If the chosen business case was of low quality, it is possible that differences in argumentation in essays responding to this case could be ascribed to the case itself, not to the nature of the prompts. If the argumentation in the written essays was not a function of the prompts, then the results would lack internal validity. The use of an existing and expertly written business case was, therefore, a necessary step in ensuring that the case itself was sufficient to support many different types of responses and argumentation. Of relevance was the fact that the Yale School of Management’s business cases were designed to be ill-structured instructional/academic, in that they do not contain unambiguous answers. The reliability of the study was increased by ensuring that the chosen business case was ill-structured instructional, in keeping with the research focus of the current study. Therefore, numerous steps were taken to ensure both the reliability and validity of the study. Moreover, the researcher consulted with the professor to ensure that the case studies were appropriate for the course taken.

The raters independently reviewed the case studies and solutions to ensure the cases were approached properly and responses focused on solutions. Both raters have doctorates in finance and are business school professors. One rater is the associate dean at the institution where the study was conducted but is not the professor for these students. The second rater is an emeritus at

an R1 school and a former associate dean. Both raters are well educated and have published in A1 journals. Moreover, both raters have worked together in the past, where the first rater was the latter's advisor during the doctorate degree process. Inter-rater reliability was shown through Pearson's correlation coefficient. Table 1 summarizes the descriptive statistics, whereas Table 2 shows the Pearson's correlation coefficients to indicate inter-rater reliability.

Table 1

Inter-rater Descriptive Statistics.

	<i>M</i>	<i>SD</i>	<i>N</i>
NPR1	8.750	3.681	32
RhR1	13.938	2.526	32
DR1	17.281	3.050	32
NPR2	9.688	2.833	32
RhR2	12.813	2.507	32
DR2	16.188	2.455	32

Table 1 showed that the means for related prompts were similar. In some cases, there was more deviation in the standard deviation. For example, although NPR1 had the lowest mean (8.750), it had the highest standard deviation (3.681). Conversely, DR2 had the fifth highest mean (16.188), but had the lowest standard deviation. The second table shows the inter-rater reliability statistics.

Table 2

Matrix of Inter-rater Reliability Statistics (Pearson's Correlation Coefficients).

	NPR1	RhR1	DR1	NPR2	RhR2	DR2
NPR1	1					
RhR1	0.387*	1				
DR1	0.084	0.333*	1			
NPR2	0.868**	0.349*	0.96	1		
RhR2	0.418**	0.889**	0.353*	0.414*	1	
DR2	0.180	0.366*	0.953**	0.157	0.378*	1

Note: * $p < .05$; ** $p < .01$

Pearson's correlation coefficients indicated the reproducibility of the outcome (Deans, 2017). The goal of determining reproducibility shows the extent of consistent results when the study is repeated (such as with multiple raters). Table 2 shows that the majority of the Pearson correlations were statistically significant at either the 0.05 (*) or 0.01 (**) level. Therefore, of the 36 possible pairs, 25 (69.4%) were found to be consistent. Inconsistencies were resolved after discussion and agreement between the raters.

Procedures

The experimental procedure was based on a two-sample approach where the participants of the study were asked to work online. The two samples were asked to write three essays connected to the three case studies based on specific prompts representative of the experimental conditions according to the section/group they were assigned. Both groups of the sample participated in the No Prompt to match the RQs and the Instructional materials above during the first week to develop a baseline data. Two sample section participants were asked to write the three essays used in the experimental procedure and the experimental condition (a) no prompt, (b) rhetorical prompt and (c) dialectical prompt. The involvement of the professor was limited to making the case studies mandatory assignments. However, the grading rubric was different and not related to the study.

Both sections started with a No Prompt to match the RQs aligned to the instructional materials above during the weeks the experiment was to be implemented, after the first half of the semester (post mid-term). Both sections were of the same MBA Essentials II course. All students were in their first year in the program and have completed MBA Essentials I. The assignment was given in their last two weeks prior to exams in both sections. Although the sections were different lengths (the first was 14 weeks and the other was expedited at 9 weeks), all students had the same amount of time for this assignment. Following the No Prompt Case and within the same week the students continued in the same week as follows:

Section 1: Rhetorical Prompts first and Dialectical prompts second

Section 2: Dialectical prompts first and Rhetorical prompts second

The MBA course is required, and all students who take the course have completed the same pre-requisites MBA Essentials courses. Both the cases and prompts for this study were designed for use by undergraduate business students and are therefore not likely to require specific training. Deans (2017) also argued that, for undergraduate students writing essays on topics within their major, prompt training was not a necessity. Figure 1 presents a flowchart to outline the samples and the procedures used in this study.

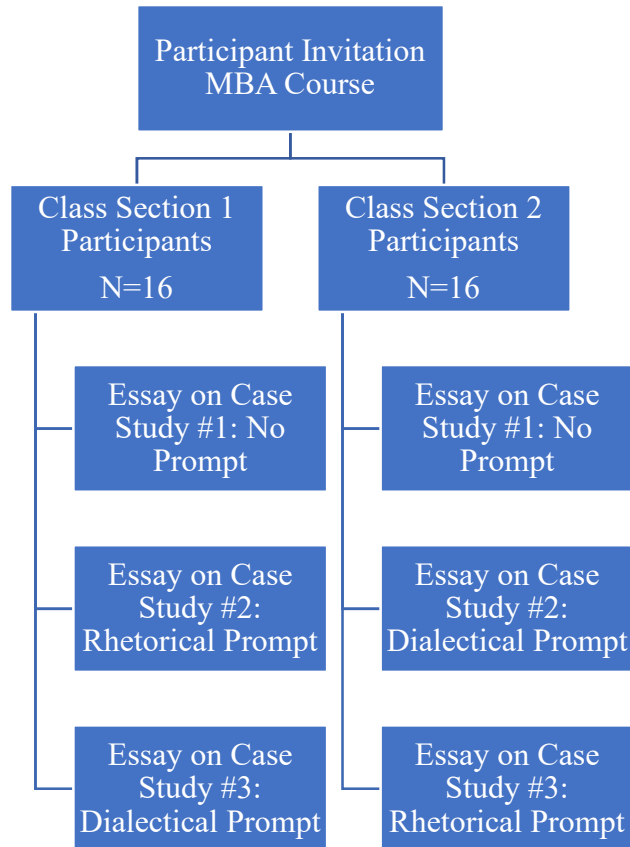


Figure 1. Sample and Procedures Flow Chart

Data Analysis

Research Question 1

The first research question of the study was: Is there a statistically significant relationship between type of argumentative prompt and argumentative depth? For this research question, each participant wrote three essays after being provided with (1) no prompt; (2) rhetorical prompt; and (3) dialectical prompt. The order of prompts varied to account for the possible confounding effect of improvement over time. It was possible, for example that, by the time participants wrote their third essay and their argumentative depth may have improved simply as a function of

repeated exposure to writing tasks. However, the purpose of the experimental procedure was not to measure the improvement of argumentative depth as a function of exposure to writing, but as a function of the prompt itself. The argumentative depth was evaluated by looking at the degree of nuance and complexity in the responses toward the rhetorical and dialectical prompts. For this reason, varying the order of the prompts was necessary to ensure the internal validity of the study.

The dependent variable was the argumentative depth, measured across two sections, and the independent variable was the type of argumentative prompt. The use of multiple measures of argumentative depth as the dependent variable suggested the need to conduct a Repeated Measures Analysis of Variance (ANOVA) in SPSS rather than standard ANOVA, which assumed the measures of the dependent variable were not repeated and were not correlated with each other (Field, 2013). Tukey's post hoc multiple comparison tests were also conducted to identify if the pairwise differences between the mean scores for argumentative depth with respect to each type of prompt (i.e., no prompt, rhetorical prompt, or dialectical prompt) were significantly different from each other. The statistical significance of the results of ANOVA was assumed if $p < .05$ for the ANOVA test statistics. However, the recent official statements issued by the American Statistical Association assert that a p -value alone does not reflect the strength of the effect(s) under investigation. Furthermore, whether or not a p -value is less than or greater than an arbitrary threshold level (typically .05) should never be used alone to draw scientific conclusions, or to determine whether hypotheses should be rejected or accepted (Wasserstein & Lazar, 2016; Wasserstein, Schrim, & Lazar, 2019). As highlighted by Vacha-Haase (2001), when conducting research in education "Statistical significance should not be considered as one of life's guarantees. Effect sizes are needed" (p. 219). The magnitudes of the effect sizes were

therefore interpreted to determine if the results of ANOVA had practical significance, implying that the effects of the argumentative prompts on argumentative depth were strong enough to be important and meaningful in the context of educational research (McMillan & Foley, 2019). The effect sizes for the independent variables in ANOVA were estimated using partial η^2 , and the effect sizes of the pairwise comparison between means were estimated by Cohen's d . The interpretation of partial η^2 was .04 = the recommended minimum effect size to indicate the practical significance of social science data; .25 = moderate effect; .64 = strong effect. The interpretation of Cohen's d was .41 = the recommended minimum effect size to indicate the practical significance of social science data; 1.15 = moderate effect; 2.70 = strong effect (Ferguson, 2009).

Research Question 2

The second research question of the study was: Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth? Argumentative depth was the dependent variable. The argumentative prompt type was the independent variable. The frequency of five alternative positions was the hypothesized mediator (i.e., a third variable that may explain the mechanism or process that underlies the relationship between an independent variable and a dependent variable (Baron & Kenny, 1986; Kenny, 2019; Preacher & Hayes, 2004). A generalized mediator model is outlined by the path diagram in Figure 2. The top diagram shows the direct effect of the independent variable on the dependent variable. The bottom diagram shows the indirect effect of the mediator on the relationship between the independent and the dependent variable. The mediator is located at the center of a triangle of arrows between the independent and dependent variable.

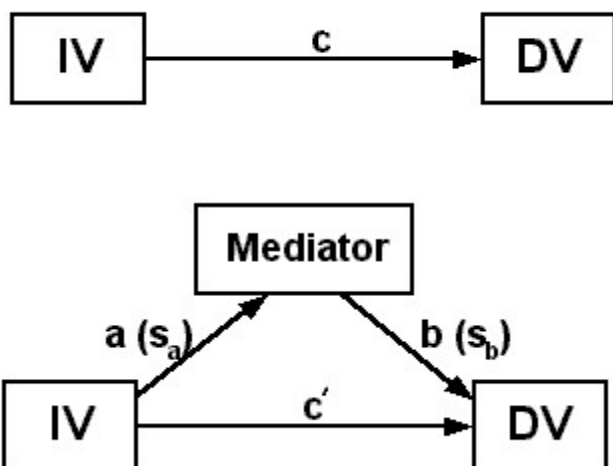


Figure 2. Path diagrams to illustrate the effects of mediation

Note: IV = independent variable; DV = dependent variable. a = unstandardized partial regression coefficient between IV and mediator; $a(s_a)$ = s_a = standard error of a ; b = unstandardized partial regression coefficient between mediator and DV; s_b = standard error of b ; c = unstandardized partial regression coefficient (direct effect) between IV and DV excluding the effect of mediation; c' = unstandardized partial regression coefficient between IV and DV including the effect of mediation.

If mediation is complete, then the mediator explains 100% of the correlation between the independent variable and the dependent variable. Complete mediation is indicated if the direct effect in the mediator model (c' in Figure 2) is zero. If mediation is only partial, then the mediator explains less than 100% of the correlation between the independent variable and the dependent variable. Partial mediation is indicated if the direct effect in the mediator model (c' in Figure 2) is statistically significant, and is reduced compared to the direct effect in the model without mediation (c in Figure 2). Partial mediation implies that there is still some variance in the dependent variable that is not explained by the mediator, but is explained by one or more other extraneous mediator variables that have not been considered.

Several statistical tests have been developed to examine mediation. The Sobel test was used to address RQ1 using the online calculator at <http://quantpsy.org/sobel/sobel.htm> (because the Sobel test is not available in SPSS). Significant mediation was indicated if $p < .05$ for the Z statistic computed by path analysis where: $Z = a*b / \sqrt{(b^2*S_a^2 + a^2*S_b^2)}$ (Preacher & Hayes, 2004). However, statistical significance alone did not measure the strength of the mediating effect. The mediation effect was indicated by the reduction in the partial regression coefficient for the direct effect in the absence vs. the presence of mediation (c minus c'). The effect size of the mediator model indicated by R^2 was also taken into account. The interpretation of R^2 was .04 = the recommended minimum effect size to indicate the practical significance of social science data; .25 = moderate effect; .64 = strong effect (Ferguson, 2009).

Research Question 3

The final research question was: How are types of argumentation strategies (including verification, rebuttal, elaboration, and evidence) utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts? The qualitative data analyzed to address this question were the essays written by the students in response to the dialectical and rhetorical prompts. Initial attempts were made to address RQ3 using qualitative data analysis software, specifically NVivo. This software classified the qualitative data into theme nodes and case nodes. A node is a collection of units of information (e.g., phrases, sentences, or paragraphs) extracted from the essays, each of which was termed a “reference”. A theme node is a collection of references referring to a common topic, concept, idea or experience. A case node is a collection of references about a person, place, site, or organization (Shonfelder, 2011). Theme nodes were utilized in this study to address RQ3. The references within each theme node were coded using the rubric for the argumentative strategies in Appendix G defined by Deans (2017).

This a priori template underpinned the extraction of four primary themes, identified as verification, rebuttal, elaboration, and evidence. The four primary themes were classified by NVivo into pairs based on the type of argumentative prompt (dialectical or rhetorical).

NVivo provided a summary table of the frequency of the references within each theme node, classified by the four primary theme nodes, and divided into dialectical and rhetorical. NVivo also provided quantitative data on the percentage coverage of each reference within each theme node. Z tests for the comparison of proportions were conducted to determine if the frequencies of the references in response to the dialectical prompts were significantly ($p < .05$) greater than the frequencies of the references in response to the rhetorical prompts within each of the four thematic nodes. However, the extensive output provided by NVivo, based on mechanistic and rigid processes that were mainly out of the control of the researcher appeared to be confusing and potentially misleading with respect to identifying the meaning of each of the references. The NVivo output guided the researcher to focus on the volume and breadth of the references within each node, but did allow the researcher to interpret the depth of meaning that was latent within each phrase, sentence, or paragraph. The NVivo output appeared to exceed the limits of the valid conclusions that the researcher could draw from the qualitative data, through the coding of an excessive number of references, not all of which appeared to have any semantic or latent meaning with respect to the argumentative strategies in Appendix G defined by Deans (2017). It was not clear to the researcher why NVivo classified the references into so many different nodes. It appeared that NVivo was unable to interpret the subtle connotations, nuances, or shades of meaning expressed within the phrases, sentences, and paragraphs provided by the students; these different modes of expression could better be ascertained cognitively (i.e., by the human mind) to identify mutually exclusive manifestations of the four primary themes (i.e.,

verification, rebuttal, elaboration, and evidence). Consequently, the researcher agreed with the many criticisms expressed in the literature, regarding the problems and difficulties associated with the use and misuse of NVivo and similar software for qualitative data analysis (e.g. Rodik & Primorak, 2015; Shonfelder, 2012; St John & Johnson, 2000; Zamawe, 2015). The output from NVivo was interpreted only as a guide. The “broad brush” coding feature of NVivo guided the extraction of relevant references corresponding to the four pre-defined types of argumentative strategy (i.e. Verification, Elaboration, Rebuttal, and Evidence). These four topic codes were the a priori template used to identify the four primary themes, rather than those generated by NVivo. The primary themes had already been defined by the researcher before the thematic analysis was conducted. NVivo was unable to extract the depth of meaning required to identify secondary themes within each primary theme, by searching for selected words and phrases among the coded sentences. The researcher found that it was essential to manually code the sentences corresponding to the multiple manifestations of each primary theme, and to manually combine and aggregate these coded sentences into related categories, in order to identify secondary themes (e.g., Objectives, Opinions, Theory, and Recommendations within the primary theme Verification).

Furthermore, the researcher was required to apply the subjective judgement of an experienced teacher in order to assess the relative quality or effectiveness of the different arguments presented by each student in response to the dialectical vs. rhetorical prompts. NVivo was unable to judge the essays in the same way as an experienced teacher. Concerns have been raised in the literature about the instructional and assessment value of automated essay grading software. For example, Dikli & Blayle (2014) found that the judgements of instructors were perceived to be better than automated essay grading software to assess the quality of students’

essays, and students rated instructor feedback as more valuable than the feedback output by the software.

The output from NVivo was therefore interpreted only as a guide, and not as a definitive source of in depth analysis. In addition to the output provided by NVivo, the traditional manual method, applied by the two raters to conduct qualitative analysis without the use of software, was based on the approach described by Maguire and Delahunt (2017). This approach, which was appropriate for qualitative research in education and teaching, was based on a framework initially designed for research in psychology by Braun & Clarke (2006). The framework involved the following six steps:

- Step 1: Becoming thoroughly familiar with the qualitative data.
- Step 2: Generating an initial code for each unit of information (i.e. phrase or sentence).
- Step 3: Identifying the primary themes based on the initial coding.
- Step 4: Identifying secondary themes, by coding different manifestations of the primary themes.
- Step 5: Reviewing and refining the coding of the primary and secondary themes.
- Step 6: Tabulating, interpreting, and discussing the results of the thematic analysis.

Braun & Clark's (2006) framework distinguishes between semantic and latent themes. Semantic themes do not search for anything beyond interpreting the simple meaning of what was said or written by the participants. The identification of semantic themes requires a bottom up approach, whereas the identification of latent themes requires a top down approach. A bottom up approach implies that semantic themes are not underpinned by predefined concepts or extraneous sources of information. The emergence of semantic themes from qualitative data require the researcher to take a neutral stance, by setting aside all previous knowledge of the topic under investigation. The identification of latent themes, in contrast, requires a top down approach, requiring the researcher to look beyond the simple meaning of what was said or written. Latent themes are extracted from qualitative data through the application of a predefined template consisting of priori codes based on concepts derived from previous research (e.g. a literature

review). Latent themes were more applicable than semantic themes to examine which types of argumentation strategies were utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts. The four latent themes (which were the same as the thematic nodes identified by NVivo) were identified as follows:

1. Verification: an attempt to verify a claim through some form of inductive argumentation.
2. Rebuttal: an attempt to refute a claim through some form of inductive argumentation.
3. Elaboration: the presentation of rich detail related to embellish a claim.
4. Evidence: the presentation of convincing evidence to substantiate a claim.

The units of information classified within each primary theme were interpreted separately for the responses to the dialectical and rhetorical prompts.

Verification points (one point for each comment) were given when students made positive comments about a strategy/course of action that should be followed and provided some arguments why that course of action should be followed. Usually the students used expressions like “this is the best option,” “this is the right decision,” “this strategy will improve operations,” “I agree with what the company is doing,” etc., that clearly identified their agreement. At other times they would suggest that this decision is good by saying “the advantages outweigh the disadvantages,” “the company should do this” or “It is crucial for the company to do this.”

Rebuttal points (one point for each comment) were awarded when the students made negative comments with respect to a strategy or expressed disagreement with a specific course of action. Sample expressions would be “I would recommend the company NOT do that,” “I disagree,” “I am not sure I agree,” “this is not the best solution” or “the company is heading in the wrong direction.” Some students expressed disagreement by listing what the strategy would lead to effects that are clearly negative such as increased costs, growing pains, dissatisfied employees, slower decisions, reduced efficiency, etc.

Elaboration points (one point for each unit of detailed information) were awarded when the students provided rich detail in support of their opinion, for example, when they presented several reasons to explain why their argument was correct. A common theme among the answers that were awarded high points was that they ranked the supporting reasons in order (first, second etc.). They were also awarded elaboration points when they did not present several reasons, but they explained in detail why their point was correct and the logic behind their opinion to support or rebut an argument.

When students provided objective information to support their arguments, they were awarded evidence points (one point for each unit of objective information). The most common type of objective evidence was quantitative data to support an argument. The quantitative evidence was derived from the cases themselves or from research that the students were familiar with. Some students referred to arguments from articles or books. Another common type of evidence were references to real-life cases/companies that have been in the same situation and made similar decisions that turned out to be positive or negative, depending on the argument.

Reflexivity

The results of the qualitative analysis could potentially be influenced by confirmation bias, meaning that researchers might consciously or unconsciously distort their interpretation of the qualitative data through fallacious thinking and/or erroneous judgements in order to confirm their own personal beliefs and prejudices (Oswald & Stefan, 2004). To eliminate confirmation bias, and to improve the credibility of the findings, the raters applied reflexivity, meaning that they reflected on the similarities and differences in their interpretation of the qualitative data, some of which could be manifestations of their own personal beliefs and prejudices (Day, 2012). The two raters completely agreed on the classification of the primary themes (i.e., verification,

rebuttal, elaboration, and evidence) as identified by NVivo. There were, however, some differences and/or disagreements between the raters, regarding the number and manifestations of the rebuttal or verification claims and the quality of claims based on the rubric in Appendix G defined by Deans (2017). All disagreements between the raters were resolved through consensus coding and reliability coding, where the raters independently coded the data and then reached agreement after multiple meetings to discuss their results.

Triangulation

Triangulation in the context of research in educational settings generally refers to comparing and contrasting the results of the qualitative and quantitative analysis of the data collected using two or more methods in the study of the same phenomenon (Fraenkel & Wallen, 2011). Triangulation is reputed to overcome the weaknesses and biases which may have arisen from the use of only one method. Consequently, if the findings of this study using both qualitative and quantitative methods converged, and generated similar results, then the conclusions may be more credible. However, convergence was not necessarily expected, because the statistical analysis of quantitative data, underpinned by objectivism, and the thematic interpretation of qualitative data, underpinned by constructivism looks at the results from different etymological perspectives (Denzin & Lincoln, 2008).

Different approaches to triangulation have been applied by mixed-methods researchers in education for over 25 years (Denzin, 1997). Guion (2002) classified triangulation into five categories (a) data triangulation, involving the comparison of information across time, space, and/or persons; (b) investigator triangulation, which uses multiple rather than single observers to record and compare the same event; (c) theory triangulation, which applies different theories to explain contradictory or similar findings; (d) environmental triangulation, which examines the

effects on the findings of the different locations or settings where the study took place; and (e) methodological triangulation, which seeks to find convergence and corroboration of findings obtained using different methods. The current study applied methodological triangulation, because both quantitative and qualitative methods of data collection and analysis were applied to address the same research questions regarding the effects of argumentative prompts on alternative positions in ill-structured problem-solving.

The simplest method of methodological triangulation was applied in this study. The researcher subjectively compared the statistics that emerged from the quantitative data based on the analysis of the students' responses to ill-structured questions, against the themes that emerged from the qualitative analysis of the students' responses to the same ill-structured questions. If the overall conclusions using both quantitative and qualitative methods converged, then the researcher assumed that these conclusions may be more credible (Denzin & Lincoln, 2008). A more detailed triangulation involving a statistical assessment of the goodness of fit of the quantitative findings to the qualitative findings were not performed in this study. This modern objective approach to triangulation is only necessary if the purpose of a mixed- methods study is to fully integrate large sets of quantitative and qualitative data in order to provide deeper insights into complex multilevel processes and systems (Creamer, 2018).

CHAPTER III

RESULTS

Little is known about the role of prompts to help learners solve ill-structured learning problems. Instructors do not devote adequate time to formulate pedagogically useful prompts, and the usefulness of different types of prompt is unclear. This mixed-methods study, using quantitative and qualitative data collected from $N = 16$ learners, examined the role of different types of argumentative prompts in the writing of essays. The research questions were: RQ1: Is there a significant relationship between the type of argumentative prompt and argumentative depth? RQ2: Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth? and RQ3: How are types of argumentation strategies (including verification, rebuttal, elaboration, and evidence) utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts? Chapter 3 presents the statistical evidence to address RQ1 and RQ2 using descriptive and inferential analysis of quantitative data. The empirical evidence to address RQ3 was provided through the thematic analysis of qualitative data. This chapter is therefore presented in three sections, one for each research question.

Research Question 1

This section presents the evidence to address RQ1: Is there a significant relationship between the type of argumentative prompt and argumentative depth? Table 3 presents the descriptive statistics for the scores awarded by two researchers for the essays written by the 16 participants to measure argumentative depth, classified by the three categories of argumentative prompt (no prompt, rhetorical, or dialectical). During section 1 the rhetorical prompts were

provided first and the dialectical prompts second. In section 2, which followed section 1, the dialectical prompts were provided first and the rhetorical prompts second.

Table 3

Descriptive Statistics for Argumentative Depth (N = 16).

Type of Argumentative Prompt	Section	Argumentative Depth	
		<i>M</i>	<i>SD</i>
No Prompt	1	8.66	3.56
	2	9.78	2.63
Rhetorical	1	12.50	2.41
	2	14.25	2.22
Dialectical	1	16.00	3.23
	2	16.84	2.43

The mean scores obtained for argumentative depth ($M = 8.66$ and 9.78) were lowest when there was no prompt. The highest mean scores for argumentative depth ($M = 16.00$ and 16.84) were obtained when the type of argumentative prompt was dialectical. When the argumentative prompt was rhetorical, the mean scores obtained for argumentative depth ($M = 12.50$ and 14.25) were higher than those when there was no prompt, but lower than those when the prompt was dialectical. The descriptive statistics therefore reflected a systematic increase in argumentative depth between the three levels of prompting, from no prompt, through rhetorical, to dialectical. The similar standard deviations ($SD = 2.43$ to 3.56) and the non-significant ($p > .05$) results of Levene's tests indicated that the variances of argumentative depth were approximately equal across the three types of argumentative prompt. Therefore, the assumption of ANOVA that the

variances should be equal was not violated.

Repeated Measures ANOVA using the General Linear Model with type III sums of squares was conducted with argumentative depth as the dependent variable. The type of argumentative prompt (as well as the interaction between section x the type of argumentative prompt) were the within-subject factors. The three types of argumentative prompt were the between-subject factors. The distribution of the residuals did not violate the assumption of normality, indicated by $p > .05$ for the Shapiro-Wilk test statistics. The results of the Repeated Measures ANOVA are presented in Table 4.

Table 4

Repeated Measures ANOVA on Argumentative Depth

Effects	Factors	df	F	p	Effect Size (Partial η^2)
Within-subjects	Section	1	3.35	.074	.069
	Section x Argumentative Prompt (Interaction)	2	0.62	.541	.027
Between-subjects	Argumentative Prompt	2	59.18	<.001*	.725

Note: * Significant ($p < .05$)

The within-subject effects were not statistically significant ($p > .05$). The mean argumentative depth scores were not significantly different across the two sections. The non-

significant interaction implied that the mean scores for the two sections were not dependent on the type of argumentative prompt. The between-subject effects were statistically significant ($F(2, 45) = 59.18, p < .001$) with a strong effect size (partial $\eta^2 = .725$). The effect size reflected that a large proportion (72.5%) of the variance in argumentative depth was explained by the three types of argumentative prompt.

Table 5 presents the results of Tukey's post-hoc multiple comparison tests for the pairwise comparison of the mean differences in argumentative depth between the three types of prompt. The mean scores for argumentative depth consisted of three distinct homogeneous subsets, classified by the three argumentative prompts, as shown in Table 6.

Table 5

Post-hoc Multiple Pairwise Comparison Tests on Argumentative Depth

Prompt I	Prompt J	M_D (I-J)	p	Effect Size (Cohen's d)
Dialectic	No Prompt	7.52*	<.001*	2.66
	Rhetorical	3.36*	<.001*	1.19
No Prompt	Dialectical	-7.52*	<.001*	2.43
	Rhetorical	-4.16*	<.001*	1.35
Rhetorical	Dialectical	-3.36*	<.001*	1.45
	No Prompt	4.16*	<.001*	1.80

Note: * Significant ($p < .001$)

Table 6

Mean Scores for Three Homogeneous Sub-sets of Argumentative Depth

Prompt	Homogeneous Subset		
	1	2	3
No Prompt	9.22		
Rhetorical		13.37	
Dialectic			16.73

The results of the post-hoc tests in Table 5 confirmed that the mean differences between the scores for argumentative depth were significantly higher ($p < .001$) when the prompt was dialectical compared to when there was no prompt ($M_D = 7.52$) or a rhetorical prompt ($M_D = 3.36$). When there was no prompt the argumentative depth was significantly less ($p < .001$) than when the prompts were dialectical ($M_D = -7.52$) or rhetorical ($M_D = -3.16$). When the prompt was rhetorical, the mean argumentative depth was significantly less than when the prompt was dialectical ($M_D = -3.36$), but greater than when there was no prompt ($M_D = 4.16$). The effect sizes (Cohen's $d = 1.19$ to 2.66) indicated that the effects of the prompts on the mean differences were moderate to strong.

In conclusion, the answer to RQ1 is that a statistically significant ($p < .001$) relationship was found between the type of argumentative prompt and the argumentative depth. The moderate to large magnitudes of the effect sizes reflected that the results of ANOVA had practical significance, implying that the effects of the argumentative prompts on argumentative depth were strong enough to be important and meaningful in the context of educational research.

Research Question 2

This section presents the statistical evidence to address RQ2: Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth? Argumentative depth was the dependent variable. The argumentative prompt type was the independent variable. The frequency of five alternative positions was the hypothesized categorical mediator (i.e., the third variable that may indirectly explain the mechanism or process that underlies the correlation between alternative positions and argumentative depth).

Table 7 presents the descriptive statistics of the scores obtained by 16 students for argumentative depth classified by the three types of argumentative prompt and the five alternative positions (i.e., the number of arguments discerned in raters' evaluations). The alternative positions ranged from a minimum of 0 (if no alternative positions were considered within a response) up to a maximum of 4 (if the response included two distinct "pro" positions and two "con" positions). When there was no dialectical prompt there were no alternative positions. All three types of argumentative prompt were observed when there was one alternative position. When the alternative positions = 2 the prompts were only rhetorical and dialectical. When the alternative positions = 3 or 4, the prompts were only dialectical.

Table 7

Descriptive Statistics for Argumentative Depth Alternative Positions and Prompt Type

Alternative Positions	Argumentative Prompt Type		Argumentative Depth		
			<i>n</i>	<i>M</i>	<i>SD</i>
0	1	No prompt	23	7.61	1.96
	2	Rhetorical	9	11.50	2.19
1	1	No prompt	9	13.33	1.17
	2	Rhetorical	21	13.88	1.97
	3	Dialectical	8	13.75	2.54
2	2	Rhetorical	2	16.50	3.54
	3	Dialectical	14	16.57	1.71
3	3	Dialectical	8	19.25	0.93
4	3	Dialectical	2	19.75	0.35

The highest frequency of arguments ($n = 23$) was observed when the alternative positions = 0 and there was no prompt. The lowest frequency of arguments ($n = 2$) was observed when the alternative positions = 4 and the prompt was dialectical. The mean argumentative depth was lowest ($M = 7.61$) when there was no prompt and no alternative position. The mean argumentative depth was highest ($M = 19.75$) when alternative positions = 4 and the prompt was dialectical. This analysis justified coding the argumentative prompt types using an ordinal scale (where 1 = No prompt, 2 = Rhetorical, and 3 = Dialectical) for the purpose of mediation analysis.

Figure 3 is a path diagram to illustrate the direct effect of the type of argumentative prompt on argumentative depth, excluding the mediating effect of the alternative positions.

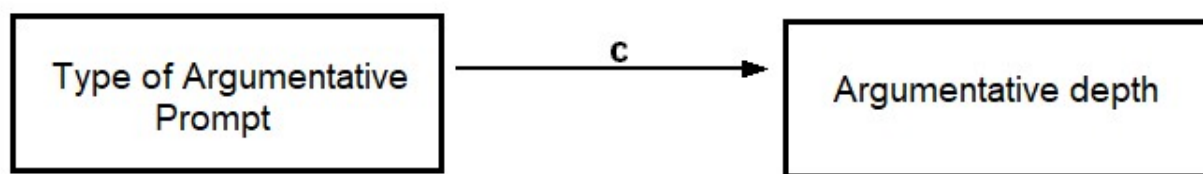


Figure 3. Path diagram of the direct effect of the type of argumentative prompt on the argumentative depth

Note: c = unstandardized partial regression coefficient

The partial regression coefficient measuring the direct effect of argumentative prompt type on argumentative depth, in the absence of the hypothesized mediator, was statistically significant ($c = 3.758, p < .001$). The magnitude of c indicated that when the type of argumentative prompt changed by one unit (e.g., from 0 = no prompt to 1 = rhetorical, or from 1 = rhetorical to 2 = dialectical, the mean score for argumentative depth increased by 3.758 units. The effect size (Adjusted $R^2 = .550$) indicated that 55.0% of the variance in argumentative depth was explained by the type of argumentative prompt

Figure 4 illustrates the path diagram of the mediator model that was applied in this study to address RQ2, which included alternative positions at the center of a triangle of arrows between argumentative prompt type and argumentative depth. Table 8 presents the results of the path analysis to test for mediation. Argumentative prompt type was a significant predictor of the frequency of the alternative positions ($a = 0.922; p < .001$). The frequency of the five alternative positions was a significant indirect predictor of argumentative depth ($b = 2.605; p < .001$). Argumentative prompt type remained as a significant ($p < .001$) direct predictor of argumentative depth after controlling for the frequencies of the five alternative positions. However, the partial regression coefficient ($c' = 1.365$) was lower than when the mediating effect was absent ($c' =$

3.758). The magnitude of c' indicated that that when the type of argumentative prompt increased by one unit (e.g., from no prompt to rhetorical, or from rhetorical to dialectical, the mean score for argumentative depth increased by 1.365 units. The effect size (Adjusted $R^2 = .729$) indicated that 72.9% of the variance in argumentative depth was explained by the type of argumentative prompt.

The results of the Sobel test in Table 8 were statistically significant ($Z = 6.408, p < .001$). Therefore, the answer to RQ2 is that there was a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth. However, the p-value did not indicate the strength of the mediating effect

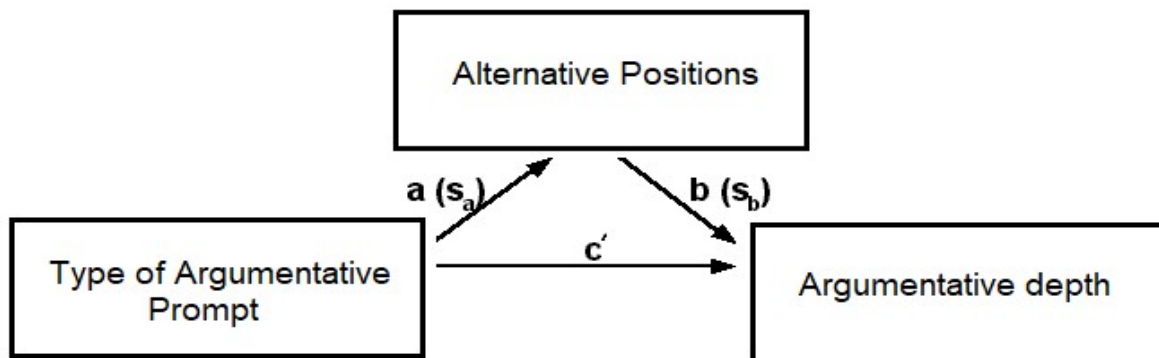


Figure 4. Path diagram of the mediator model used to address RQ2

Note: a = unstandardized partial regression coefficient between independent variable and mediator; $a(S_a) = S_a$ = standard error of a ; b = unstandardized partial regression coefficient between mediator and dependent variable; S_b = standard error of b ; c' = unstandardized partial regression coefficient between independent and dependent variable.

Table 8

Sobel Test for the Mediating Effect of Alternative Positions

Path	Unstandardized Regression Coefficient	Standard Error	<i>t</i>	<i>p</i>
Argumentative Prompt Type → Alternative Positions	<i>a</i> = 0.922	<i>S_a</i> = 0.085	10.87	<.001*
Alternative Positions → Argumentative Depth	<i>b</i> = 2.605	<i>S_b</i> = 0.328	7.94	<.001*
Argumentative Prompt Type → Argumentative Depth	<i>c'</i> = 1.365	0.405	3.35	.001*

The large effect size of the mediator model ($R^2 = .729$) and the reduction in the direct effect in the absence vs. presence of mediation ($c = 3.758$ vs. $c' = 1.365$) reflected the strength of the mediating effect. However, after controlling for the frequency of alternative positions, there was still a statistically significant direct relationship between argumentative prompt type and argumentative depth ($c' = 1.365$, $p = .001$). Therefore, the mediating effect of alternative positions appeared to be only partial. The mediation effect was not complete because the partial regression coefficient between argumentative prompt type and argumentative depth in the absence of alternative positions ($c = 3.758$) was significantly greater than zero.

The conclusion is that the frequencies of the alternative positions was not a complete mediator, because it did not explain 100% of the positive correlation between argumentative prompt type and argumentative depth. The results of the mediation analysis provided evidence to conclude that there was still some unexplained variance in argumentative depth that was not due

to the alternative positions, but was probably caused by extraneous variables that were not measured or taken into account in this study.

Research Question 3

This section presents the statistical evidence to address RQ3: How are the types of argumentation strategies utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts? Table 9 presents the output from NVivo, based on the unexplained mechanical process that generated the frequencies of references within each thematic node. The total number of references was 214, of which the majority, (131, 61.2%) were in response to dialectical prompts, with a smaller proportion (83, 38.8%) in response to rhetorical prompts.

The most frequent references were associated with verification strategies (84, 39.2%) followed in order of magnitude by elaboration (56, 26.2%); rebuttal (39, 18.2%), and evidence (35, 15.9%). Within each thematic node the highest frequencies of references were associated with the elaboration strategy (39, 69.6%) and the evidence strategy (21, 60.0) in response to dialectical prompts.

Table 9

Frequencies of Responses to Dialectical and Rhetorical Prompts within each Thematic Node

Thematic node (Argumentative strategy)	Frequencies of References				Total	Test for Comparison of Two Proportions	
	Dialectical prompts		Rhetorical prompts			Z	p
	f	%	f	%			
Verification	48	57.1	36	42.9	84	1.85	.064
Elaboration	39	69.6	17	30.4	56	4.15	<.001*
Rebuttal	23	59.0	16	41.0	39	1.59	.056
Evidence	21	60.0	14	40.0	35	1.70	.045*
Total	131	100.0	83	100.0	214		

Note: * Significant difference ($p < .05$)

The results of Z tests for the comparison of two proportions indicated that, with respect to the elaboration and evidence strategies, the frequencies of the responses to the dialectical prompts were significantly ($p < .05$) greater than the frequencies of the responses to the rhetorical prompts. However, the frequencies of the responses to the dialectical prompts were not significantly different ($p > .05$) from the frequencies of the responses to the rhetorical prompts with respect to the verification and rebuttal strategies.

The results of the qualitative analysis are presented in order of the four primary themes: Verification, Elaboration, Rebuttal, and Evidence. The evidence for each primary and secondary theme is confirmed by verbatim quotations, including phrases and sentences extracted directly from the essays. Some students did not provide effective arguments, even though they attempted to explain why they were correct. Some students simply expressed agreement or disagreement with what the company was doing without supporting their arguments by Verification, Elaboration, Rebuttal, and Evidence. These responses were omitted from the thematic analysis.

Verification

The verification strategy refers to various attempts to substantiate a claim through some form of inductive argumentation. The primary theme of verification was classified into four secondary themes, as defined in Table 10.

Table 10

Secondary Themes Classified Within Primary Theme 1: Verification

Secondary theme	Definition
1.1. Objectives	The company objectives are considered to verify a claim.
1.2. Opinions	Verifying a claim by offering informed personal opinions with reasons.
1.3 Theory	Verifying a claim using explicit or implied theories or business models.
1.4. Recommendations	Verifying a claim with recommendations using case-based factual information.

Each secondary theme was manifested by a particular way in which the students attempted to verify their claims by verification. Table 11 presents some typical examples of quotations extracted from the essays to identify the secondary themes. The students verified their claims by four ways of interpreting the case-based information, including considering the company objectives, offering opinions, referring to existing theories or models, and making recommendations. Table 11 presents two examples of references (i.e., verbatim quotations extracted from the essays) that were extracted in response to dialectical prompts, and two examples of references extracted in response to rhetorical prompts, within each secondary theme. All the references are in italics, and are enclosed by quotations (to emphasize that these are quotations, and they should not be exposed as plagiarism by Turnitin software).

Table 11

Quotations Used to Identify Secondary Themes Within Primary Theme 1: Verification

Secondary theme	References	Prompt
1.2. Objectives	<i>“Elden Holdings wants to focus more on expanding his consumer base and making sure they are receiving the best quality customer service at this time in the company’s expansion, he should choose to maintain the decentralized system of administration and increasing the number of employees”</i>	Dialectical
	<i>“Elden Holdings should strive to be on the forefront of the digitization movement”</i>	
	<i>“The alternative, the path the company has already begun to follow, of a web-based application and a decentralized management plan is truly the best option for Elden Holdings”</i>	Rhetorical
1.2. Opinions	<i>“Developing better operational management process can help drive cost reductions, inventory management and reporting structure are areas to look at”</i>	
	<i>“If I were the managing director if Elden Holdings, I would have implemented the more centralized form of Web administration”</i>	Dialectical
	<i>“If I was the Manager, I would recommend sticking to the original status quo while implementing various means of technology to help manage some of the growth.”</i>	
	<i>“In my professional opinion, the answer to this question is yes, it will ultimately help improve management operations. Not only will they be able to control the proper management of the employees, but this will also, as stated in the case, help lower turnover”</i>	Rhetorical
	<i>“If I were the manager in charge of making these decisions for Elden Holdings, I would implement the same type of web-based application that would allow for easier operations”</i>	

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 1: Verification

Secondary theme	References	Prompt
1.3. Theory	<p><i>“Web-based application also allows for one central server or data storage facility to be used rather than the multiple mainframe locations in the decentralized model today, everyone is doing more with less”</i></p> <p><i>“In order to reduce operating costs and increase sales Coca-Cola will have to move away from its traditional model”</i></p>	Dialectical
	<p><i>“The firm has already gathered sufficient evidence that their previous model of operation was not working”</i></p> <p><i>“I do agree with Elden Holdings’ approach to proposed administrative management. This approach is an adjustment to the direction management has decided to go to through a “shift to a decentralized model of business over the past two years”</i></p>	Rhetorical
1.4 Recommendations	<p><i>“The advantages of the new system far outweigh maintaining the current system”</i></p> <p><i>“Their ability to control retailers’ sales methods puts them at an advantage, and increases their competitive footing with brands such as Pepsi or the generic brands”</i></p>	Dialectical
	<p><i>“This transition is one that makes sense and saves the company money, the case study stated that there would be an added responsibility that the employees would see, but the cost savings should offset the extra work that the employees will face. In addition to a more efficient work environment, the company should see a lower rate of turnover due to more efficient systems”</i></p> <p><i>“I would advise Elden Holding to immediately begin to conduct good exit interviews for employees who are leaving the company, they need to get a better idea of what is causing them to leave”</i></p>	Rhetorical

The type of prompt (rhetorical or dialectical) appeared to make little difference to the extraction of the references used to identify verification. Verification strategies appeared to be utilized in a similar way across both rhetorical and dialectical prompts. The type of prompt appeared not to be a significant factor when extracting examples to identify verification.

Elaboration

The elaboration strategy refers to various attempts to add rich details relating to a claim. The primary theme of elaboration was classified into five secondary themes. The five secondary themes in Table 12 were manifested by the different ways in which the students elaborated their claims. Table 13 presents some typical examples of the quotations (one in response to a dialectical prompt, and one in response to a rhetorical prompt) that were extracted from the essays to identify the five secondary themes. Some students presented introductory paragraphs to initiate the development of a strong response to the prompts and outline the ways to present the related arguments. Opinions based on factual evidence were presented, emphasizing the importance of including facts in case studies. The students considered the effects of different actions, the successful outcomes, and the use of internal and external resources, to elaborate their arguments.

Table 12

Secondary Themes Classified Within Primary Theme 2: Elaboration

Secondary theme	Definition
2.1. Introduction	Elaboration by using an introductory paragraph, used to guide the remainder of the response.
2.2 Opinions	Elaboration using opinions supported by factual evidence.
2.3. Benefits	Elaboration by demonstrating the benefits of certain actions.
2.4. Success	Elaboration by providing effective arguments related to successful outcomes.
2.5. Resources	Elaboration by discussion of internal and external resources.

The type of prompt (rhetorical or dialectical) was found to make a difference to the elaboration of arguments. Most of the references were found to be responses to dialectical prompts. The type of prompt appeared to be a significant factor when extracting examples of references to identify elaboration.

Table 13

Quotations Used to Identify Secondary Themes Within Primary Theme 2: Elaboration.

Secondary theme	References	Prompt
2.1. Introduction	<i>“By getting more involved in retailer operations and setting general standards the company can protect its brand and insure uniformity. Once best practices have been identified they will better be able to ensure that they are being effectively utilized at all facilities. Increased monitoring of retailers and a set of dictated practices for those retailers to follow will allow the company to continue its growth without becoming operationally fragmented.”</i>	Dialectical
	<i>I believe that the use of flat rate sales is a short-sighted solution to a bigger problem. Instead of looking at supply and demand models for different areas and demographics they are offering up a what I believe is an attempt with a short term (and easily implemented) solution for a larger issue. To charge a flat rate across the board for Coca-Cola products it may mean that you would put it a price point where consumers may not be able to afford it and customers would potentially be lost. In addition, this could impact a strategy where Coca-Cola could potentially enter a new market, or a market dominated by a competitor with lower prices to win consumers over. I believe that a one-size fits all strategy would be detrimental for Coca-Cola.”</i>	Rhetorical
2.3. Benefits	<i>“Workers assuming a larger role in the administration will provide more knowledgeable decision making, rather than having leadership make a decision without the necessary understanding. Addressing the administrative management also affords management the ability to utilize a centralized platform, which will consolidate information and increase transparency. Utilizing online timesheets will help management address inaccurate employee timesheets, and the potential additional costs that came along with them”</i>	Rhetorical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 2: Elaboration.

Secondary theme	References	Prompt
2.4. Success	<p><i>“The Coca Cola Company is well known around the world. The Coca Cola logo is one of the more recognizable logos that are out there. I would want to know how retailers are representing my brand and company. You need to know how retailers are representing your brand, especially with a brand that is easily recognized like Coca Cola. If these retailers are not providing superb customer service when they are at these stores, it gives the competition a chance to come in and steal the business away. Competition is a good thing to have, but if you are not able to manage your growing staff, problems can occur ... The retailers would be informed and knowledgeable of what they are selling. This would allow them to provide superb customer service and set them aside from the competition. In my experiences, nothing beats great customer service. Training your retailers on the products are very important. Technology is always changing and making sure your retailers are trained on the most recent types your company is currently using is very important.”</i></p>	Dialectical
	<p><i>“While it is important for Elden Holdings to remain true to its core values and mission as a company, they must adapt and change in order to decrease the cost of operations and improve for the future. Web-based technological advancements have made it easier than ever for businesses to store data and process information for employees. Having everything in one central location will also help with organization and consistency across the business.”</i></p>	Rhetorical
	<p><i>“Workers assuming a larger role in the administration will provide more knowledgeable decision making, rather than having leadership make a decision without the necessary understanding. Addressing the administrative management also affords management the ability to utilize a centralized platform, which will consolidate information and increase transparency. Utilizing online timesheets will help management address inaccurate employee timesheets, and the potential additional costs that came along with them”</i></p>	Rhetorical

Rebuttal

The rebuttal strategy refers to various attempts to refute a claim through some form of inductive argumentation. The primary theme of rebuttal was classified into five secondary themes, specifically drawbacks, facts, problems, management, and opinions. The five secondary themes defined in Table 14 were manifested by the different ways in which the students refuted their claims. Table 15 presents some typical examples of the quotations extracted from the essays that were interpreted to identify the five secondary themes in response to dialectical and rhetorical prompts.

Table 14

Secondary Themes Classified Within Primary Theme 3: Rebuttal

Secondary theme	Definition
3.1.Drawbacks	Rebuttal by reference to issues concerning the disadvantages of certain actions.
3.2. Facts	Rebuttal by providing factual evidence provided in the case study.
3.3 Problems	Rebuttal by demonstrating the difficulties associated with certain actions.
3.4. Management	Rebuttal by providing arguments about the impact of management.
3.5. Opinions	Rebuttal by providing arguments based on personal opinions rather than facts.

The type of prompt (rhetorical or dialectical) was found to make a small difference to the responses associated with rebuttal strategies. Rebuttal appeared to be utilized slightly more in response to dialectical prompts than rhetorical prompts. The type of prompt appeared to be a factor when extracting references to identify rebuttal.

Table 15

Quotations Used to Identify Secondary Themes Within Primary Theme 3: Rebuttal

Secondary theme	References	Prompt
3.1. Drawbacks	<i>“The first issue with this method is that Coke will create a surplus or a shortage in their product. It will place restrictions on the retailer forcing them to shift their supply curve to the left or right to compensate for the price”</i>	Dialectical
	<i>“Some of the biggest drawbacks from switching to a web-based management system is the dependency on the internet, as well as, browser issues. Many managers like to have analog systems in place to ensure that the company can still function if something happened to internet access. Putting these systems in place almost completely defeats the purpose of moving to a web-based management application altogether. Some web browsers cannot access certain web-based systems, which could account for a significant amount of “user error” thus inhibiting productivity”</i>	Rhetorical
3.2. Facts	<i>“Monitoring how retailers conduct their businesses is not the only solution in the attempt to solve Coca-Cola’s declining sales performance. The argument can certainly be made that increased autonomy for each business retailer will help restore earnings”</i>	Dialectical
	<i>“The con of this, especially once a company grows larger, is the need for more business sectors such as marketing. Without shared resources, additional needs come at a cost. Another risk is poor management and bad decision making on the part of the authoritative individual(s). Inconsistent policies and practices may cause loss of customers and go as far as lawsuits”</i>	
	<i>“If I were a manager at this company trying to keep things at the status quo I would bring up the disadvantages of moving forward with this type of business model. A decentralized company would bring more bureaucratic into our business. Bureaucratic makes procedure the priority at the expense of efficiency and common sense. This is not something we would want our company to have more of best we don’t want anything to affect with our efficiency. Also, if our company continues</i>	Rhetorical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 3: Rebuttal

Secondary theme	References	Prompt
	<p><i>to grow it would be harder for our corporate managers to strategically plan effectively within our decentralized company.” These strategies showed that rebuttal strategies could be used for rhetorical prompts, but that they were not based on case facts, and more based on external resources or experience</i></p> <p><i>“Apple’s flat rate pricing is not compatible with Coca-Cola’s product line. Apple is considered a luxury electronics brand whereas Coca-Cola’s products are geared towards the general market and make their profit based on a high-volume of sales”</i></p>	
3.3. Problems	<p><i>“Personally, If I were the Managing Director, in viewing the overall problems of reduction in sales, operational costs, and dealing with changes to the expansion of clientele I would have to choose different strategies across the board to deal with the problems.”</i></p>	Dialectical
	<p><i>“I can see where this could be a problem with retailers not being able to have competitive advantage anymore. This could potentially be bad for Coca-Cola if retailers want to stop carrying their products because of this reason.” Under this strategy, it was evident that problems could be seen in both prompts, but participants had different ways of addressing these issues</i></p>	Rhetorical
3.4. Management	<p><i>“On the other hand, a decentralized system would increase the number of employees by requiring more people to handle the daily operations. Top level management decisions would take longer for information to trickle down to the low- level management. Having a decentralized system in place would allow for top level management to focus on bigger decisions while the middle level oversees operations”</i></p>	Dialectical
	<p><i>“As a manager at Coca-Cola, I would want to try to keep the price changes to a minimum, but they will need to increase prices as their costs increase. This is the only way that the company can stay financially solvent”</i></p>	Rhetorical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 3: Rebuttal

Secondary theme	References	Prompt
3.5. Opinions	<i>“There are a few downsides of the web-based centralized administration option that we need to consider. As mentioned earlier, adopting new technologies and business practices usually comes with growing pains. This results from personnel who are unfamiliar with the new system and ensuring that they are trained will take time and resources. The increase in workload for workers could also detract from their primary jobs and may place unnecessary burden on them. Another downside is the cost of implementing the new program. As the managing director I would need to do a cost comparison and market research on which web-based administration technology to use. This too can be both time and resource intensive”</i>	Dialectical
	<i>“I do not agree with Coca-Cola trying to monitor how retailers conduct their business. I feel that by forcing the retailers to sell Coca-Cola at a flat rate regardless of the place, then retailers will begin to look for a competitor that they can switch to be more profitable”</i>	Rhetorical

Subjective interpretation of the quality of the arguments presented in these examples showed that the dialectical prompt appears to be more effective when using factual evidence based on the case study. However, although agreements were supported mainly with case study facts, disagreements were supported mainly by personal opinions. In contrast rhetorical prompts are more effective than dialectical prompts when considering drawbacks. It was evident that problems could be identified using both types of prompt, but the participants used different ways to address problematic issues. When discussing the impacts of management, the dialectical prompt appeared to be more effective than the rhetorical prompt.

Evidence

The evidence strategy refers to the use of convincing factual evidence for a claim. Table 16 defines the four secondary themes that were identified within the evidence strategy, specifically Financial, Existing Arguments, Benefits, and Scenario. Table 17 presents some typical examples of the quotations extracted from the essays that were interpreted to identify the four secondary themes manifesting different aspects of the evidence strategy in response to dialectical and rhetorical prompts. Evidence was provided in response to both dialectical and rhetorical prompts. A subjective evaluation of the quality of the arguments in these examples indicated that factual evidence did not appear to be presented more effectively in response to dialectical as opposed to rhetorical prompts.

Table 16

Secondary Themes Classified Within Primary Theme 4: Evidence.

Secondary theme	Definition
4.1. Financial	Evidence based on issues concerning costs or savings.
4.2. Existing arguments	Evidence based on arguments already presented in the case-study.
4.3 Benefits	Evidence based upon the advantages of certain actions.
4.4. Scenario	Evidence based on a description of the business context or setting presented in the case-study.

Table 17

Quotations Used to Identify Secondary Themes Within Primary Theme 4: Evidence

Secondary theme	References	Prompt
4.1. Finance	<p><i>“It is stated that the company is “well concerned on the sales that they are making and whether their retailers are affecting the amount of sales or not,” (Case 3). I take this to mean that the company wants to know if individual retailers’ business affairs are affecting sales in a positive way. So, option one, monitoring, is just a business strategy that is being used to support growth in sales. Additionally, it is stated there are “other companies that are increasingly entering into this market, the style which different retailers are conducting their business may affect their sales,” (Case 3). This is just more evidence of management’s concern about the performance of retailers.”</i></p>	Dialectical
	<p><i>“There are lower costs associated with a web-based platform, as there is no specialized hardware to maintain. Moreover, the software company would own all maintenance and updates and Elden would likely only have a subscription fee and perhaps a data charge. Furthermore, having the employees participate in some of the management functions, would decrease the number of employees needed to perform administrative duties. Additional savings could be realized by splitting roles of some current employees to manage the rest of the administrative functions. These increased savings along with more satisfied employees, retained by functional, efficient management, would result in decreased production costs. In turn, the company could increase output and thereby profits.”</i></p>	Rhetorical
4.2. Existing Arguments	<p><i>“The first reason I would switch to a more centralized administration that is web-based is because of accessibility. A web-based administration would allow employees easier access to the mainframe. This could help them with access to their own timesheets, which would save management time. Then, management could administer delegations under one centralized platform. If you maintained the decentralized system and increased the number of employees, this could potentially increase the lag time between employees needing management to</i></p>	Dialectical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 4: Evidence

Secondary theme	References	Prompt
	<p><i>help them with time sheets and log ins. Thus, not really helping speed any processes up ... Switching to a more centralized administration that is web-based would also be cost efficient. If you did this, you wouldn't have to hire more employees like you would with the decentralized system of administration. With a web-based administration, you could even possibly cut out certain positions that are no longer necessary due to a computer being able to do that job. Also, a web-based administration could also save you a lot of time doing simple everyday tasks. This inherently could save Elden Holdings lots of money by decreasing the amount of time it takes for employees to get tasks done."</i></p>	
	<p><i>The company has a certain amount of "security through obscurity" using the mainframe in that a potential data thief is less likely to be familiar with such a system and its exploits, but as it grows increasingly long in the tooth both qualified technicians to work on it and hardware parts to repair it are going to grow more rare and expensive to obtain. Additionally, the system is already hindering the company's operations as it is being forced into a job which was not anticipated when it was built and for which it was not designed."</i></p>	Rhetorical
4.3. Benefits	<p><i>"As the companies continue to move into digitization, Elden Holdings can benefit from this process since access to information is readily available. Less of the old methods are compatible with the needs of a business. Using a web-based platform offers information that delivers quickly and effectively; and as a result, the focus remains in operations and helping organizations to transform their offline processes, and in the case of Elden Holdings, these processes include physical documents such as timesheets."</i></p>	Dialectical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 4: Evidence

Secondary theme	References	Prompt
4.5. Scenario	<p><i>“The market for soft drinks in the United States and China is not the same, but because of the size of each country, the two are often lumped together strategically. In actuality, two of the largest markets in the world are moving in different directions. According to a NYT article from 2017, soda consumption is down almost 20% amongst children and 11% amongst adults since 2014 in the United States, while soft drink consumption has been increasing at a healthy 3.9% year over year in China for much of the last decade.” Participant F stated: “The benefits of migrating to a cloud-based system are innumerable. Amazon Web services provides its customers a simple step by step system to migrate their systems that allows for a seamless transition to the new system, this step by step process eliminates user error by recording existing processes, designing a customized solution, modernization of code, testing and implementation”</i></p>	Dialectical
	<p><i>“A good example of this is movie theaters. Can you imagine telling one of these theaters they have to sell your product for a mere \$2.00 instead of the \$6 or \$7 they are accustomed to charging? Pepsi it is! It’s in my opinion the Coca-Cola company must go back to the drawing board and re-evaluate its company’s regulations. With all of the competition in the current market, sometimes a company must learn how to be more flexible.” Participant H stated: “As any professional knows, turnover is very costly for any business, having to hire and train employees will increase payroll costs and have negative impacts on not just your business but your reputation. I believe that this was a step in the right direction as management will have to focus less on hiring new employees and can focus more on keeping and molding current employees to perform at their best.”</i></p>	Rhetorical

Continued: Quotations Used to Identify Secondary Themes Within Primary Theme 4: Evidence

Secondary theme	References	Prompt
	<i>“Purchasing counter for quick pick up determined by the company research that new shoppers contain different habits than the classic customer, demanding, faster, more natural shopping methods. The company wants their product to be appropriately placed and presented to the customer for an ultimate experience. The burden of this action falls to the individual retailers of Coke products”</i>	Dialectical
	<i>“The legacy mainframe system is out of date, expensive to maintain, and delaying its replacement will only make it a much more daunting task in the future. As firms become more digitized, it’s better to get ahead of the curve with the newer technology, especially if this older technology is already hindering progress in the company as it becomes increasingly inefficient at managing administration processes and activities (Business Case 2, p.1).”</i>	Rhetorical
	<i>“First, a centralized system that utilizes web-based services will be built to last many years into the future. Building a web-based service to keep track of the company’s internal requirements such as payroll and management of resources will allow the company to not only save costs but also allow for time savings. With these systems, fewer employees will need to spend time compiling data and putting together reports as this can be done automatically. There may be some issues and headaches along the way with building such a system, but if done properly it will allow Eden Holding’s to function much more efficiently into the future. Another reason for moving away from the decentralized organization that the company is now operating under is due to the current turnover that the organization is experiencing. Decentralized structures tend to rely on many individuals or teams that are responsible for making business decisions. With high turnover disrupting many of the organizations’ teams, this would be very hard to manage. Moving to a centralized structure will allow one individual to make the decisions for the organization and roll out throughout the organization. While the company moves through the transition of getting established systems in place, such as the web-based services, one clear leader and decision maker would be preferred.”</i>	Dialectical

CHAPTER IV

DISCUSSION

The 32 students who participated in this mixed-methods study were asked to write essays that provide solutions to ill-structured problems, based on case studies concerning complex real-world business situations, with undefined parameters, underlying ambiguity, and without definitive solutions. There were no right or wrong solutions to these problems (Byun et al., 2014; Collins et al., 2016; Gallagher, 2015). By its nature, an ill-structured problem does not contain an implicit question, and thus prompts may be necessary to stimulate effective arguments. Several researchers have suggested that prompts may be of value to prime learners to write texts that contain argumentative depth as well as multiple forms of argumentation (Golanics & Nussbaum, 2008; Cho & Jonassen, 2002; Xun & Land, 2006). Prompts may be most useful when they specify the instructors anticipated category of reaction (Miller et al., 2016).

One commonly recognized factor that has contributed to the quality of solutions for ill-structured problems has been the depth of argumentation, a term that refers to the ability to argue effectively from multiple sides of the issue (Oh & Jonassen, 2007). Accordingly, in this mixed-methods study, the researcher evaluated the students' responses to ill-defined problems, using quantitative and qualitative analysis of the text provided in the essays written by the participating students. The quantitative approach involved an objective statistical analysis of the argumentative depth, and the number of alternative positions used in response to different types of prompt. The qualitative approach involved a subjective interpretation of the text using thematic analysis to interpret how different types of argumentative strategies were used in response to different types of argumentative prompt.

Summary of Results

Table 18 presents a summary of the answers to the three research questions that guided this study, based on the quantitative and qualitative findings presented in Chapter III.

Table 18

Summary of Answers to Research Questions

Research Question	Answer
RQ1: Is there a significant relationship between the type of argumentative prompt and argumentative depth?	A statistically significant ($p < .001$) relationship was found between the type of argumentative prompt and the argumentative depth. The mean differences between the scores for argumentative depth were significantly higher ($p < .001$) when the prompt was dialectical compared to when there was no prompt or a rhetorical prompt. When there was no prompt the argumentative depth was significantly less ($p < .001$) than when the prompts were dialectical or rhetorical. When the prompt was rhetorical, the mean argumentative depth was significantly less than when the prompt was dialectical but greater than when there was no prompt. The moderate to large magnitudes of the effect sizes reflected that the results also had practical significance.
RQ2: Is there a significant mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth?	When the type of argumentative prompt changed by one unit (e.g., from no prompt to rhetorical, or from rhetorical to dialectical), the mean score for argumentative depth increased. A statistically significant ($p < .001$) mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth was identified. This implied that alternative positions explained the positive correlation between argumentative prompt type and argumentative depth. The large effect size and the reduction in the direct effect in the absence vs. presence of mediation reflected the practical significance of the results. The mediation effect was not complete because the partial regression coefficient between argumentative prompt type and argumentative depth in the absence of alternative positions was significantly greater than zero.

Continued: Summary of Answers to Research Questions

Research Question	Answer
RQ3: How are the types of argumentation strategies utilized within alternative positions as represented in rhetorical prompts versus dialectical prompts?	<p>1. The type of prompt (rhetorical or dialectical) appeared to make little difference to the extraction of the references used to identify verification. Verification strategies appeared to be utilized in a similar way across both rhetorical and dialectical prompts. The type of prompt appeared not to be a significant factor when extracting examples to identify verification.</p> <p>2. The type of prompt (rhetorical or dialectical) appeared to make a difference to the elaboration of arguments. Most of the references were found to be responses to dialectical prompts. However, dialectical prompts did not appear to be more effective than rhetorical prompts when using the evidence strategy</p> <p>3. The type of prompt (rhetorical or dialectical) appeared to make a small difference to the responses associated with rebuttal strategies. Rebuttal appeared to be utilized slightly more in response to dialectical prompts than rhetorical prompts. The type of prompt appeared to be a factor when extracting references to identify rebuttal. The dialectical prompt appeared to be more effective when using factual evidence based on the case study. Disagreements were supported mainly by personal opinions. Rhetorical prompts were more effective than dialectical prompts when considering drawbacks. Problems could be identified using both types of prompt, but the participants used different ways to address problematic issues. When discussing the impacts of management, the dialectical prompt appeared to be more effective than the rhetorical prompt.</p> <p>4. Evidence was presented in response to both dialectical and rhetorical prompts. However, evidence appeared to be presented more effectively in response to rhetorical prompts.</p>

Research Question 1

The low p-value ($p < .001$) indicated that the data were compatible with a repeated measures ANOVA model, proposing the existence of a statistical relationship between the type

of argumentative prompt and the argumentative depth. The highest scores for argumentative depth were obtained when the prompt was dialectical compared to when there was no prompt or a rhetorical prompt. The dialectical prompts directed the students to think more deeply as they worked on a solution to an ill-structured problem, and encouraged the students to consider different perspectives and points of view as they engaged in the solution process. This finding was consistent with other researchers who suggested that different types of argumentative prompt may stimulate students to write texts that contain argumentative depth as well as multiple forms of argumentation (Bryum et al., 2014; Golanics & Nussbaum, 2008; Cho & Jonassen, 2002; Huang et al., 2015; Oh & Jonassen, 2007; Xun & Land, 2006). The overall conclusion is that argumentative prompts, irrespective of their type, appear to act as triggers that guide student engagement when confronted with an ill-structured problem learning task.

Unlike the current study, none of the previous studies cited in the literature review explicitly measured, compared, or established the strength of the effects of dialectical and/or rhetorical prompts on argumentative depth. The other researchers did not address the crucial question of whether prompt variation is an essential causal factor that may elicit superior argumentative depth. Indeed, most other researchers investigating many different types of interventions in educational settings have failed to interpret the results of inferential statistical analysis explicitly in terms of the strength of the causal effects, and therefore their conclusions are often misleading (Barry et al., 2016; Hoekstra, 2014; McMillan & Foley, 2011; Osborne, 2008; Lipsey et al., 2010).

The official statements and guidelines issued by the American Statistical Association assert that a *p*-value does not reflect the importance of the results of a statistical test, nor does a *p*-value indicate the strength of an effect (Wasserstein & Lazer, 2016; Wasserstein, Schrim, &

Lazar, 2019). The conclusion of the current study based not on the p -values, but on the effect sizes (using Ferguson's 2009 criteria) is that rhetorical and dialectical prompt types have an important effect with practical significance on the quality of argumentation in learners' problem-solving tasks. The effect size of the between-subjects ANOVA model ($\eta^2 = .725$) and the effect sizes based on the post-hoc comparisons between the mean scores (Cohen's $d = 1.19$ to 2.66) indicated that the causal effects of the prompts on the mean differences in argumentative depth were moderate to strong. The effect sizes implied that the relationship between argumentative prompts and argumentative depth was more than just a theoretical model with no practical value. The results of repeated measures ANOVA were important and meaningful in the context of educational research, and therefore the findings of the current study could potentially be interpreted and applied in practice to make policy decisions in educational settings (Barry et al., 2016; Hoekstra, 2014; McMillan & Foley, 2011; Osborne, 2008; Lipsey et al., 2010). The practical implications of the answer to Research Question 1 are discussed in a later section of this chapter.

Research Question 2

The low p -values ($p < .001$) indicated that the data were compatible with the linear regression model constructed by the researcher using Hayes (2013) method to identify the mediating effect of alternative positions on the relationship between argumentative prompt type and argumentative depth. The reason for testing for mediation was to understand the mechanism through which argumentative prompt type was related to argumentative depth. The results indicated that the frequency of alternative positions partially explained the positive correlation between the frequency of alternative positions and argumentative depth. However, the results of Sobel's test, indicating a statistically significant ($p < .001$) reduction in the direct effect of

argumentative prompt on argumentative depth after controlling for the frequency of alternative positions, did not reflect the strength of the mediating effect (Kenny, 2019).

The effect size of the mediator model was large (based on the criteria proposed by Ferguson, 2009) implying that the results of the mediation analysis had substantial practical significance. The large effect size ($R^2 = .729$) indicated that 72.9% of the variance in argumentative depth was explained. However, this effect was only partial, because not all of the variance in argumentative depth was explained by prompt type and alternative positions. Partial mediation implied that there was still some unique variance in argumentative depth that was not explained by the statistical model. The effect size of the mediator model indicated that $100 - 72.9 = 27.1\%$ of the variance in argumentative depth remained unexplained. Some of this unique variance, which was not explained by the observed prompt types and/or alternative positions, could potentially be explained by extraneous factors that might otherwise influence how learners provide solutions to ill-structured problems. This issue is considered in the subsequent sections of the chapter.

The conclusion based entirely on the data collected and analyzed in the current study was that the students demonstrated their skills to evaluate business claims in response to rhetorical and/or dialectical prompts through providing numerous alternative “pro” and “con” positions with respect to each specific claim. All three types of argumentative prompt (coded by 1 = no prompt; 2 = rhetorical; 3 = dialectical) were observed when there was one alternative position. When there were two alternative positions the prompts were only rhetorical and dialectical. When there were three or four alternative positions, the prompts were only dialectical. When dialectical prompts were used in preference to rhetorical prompts or no prompt then up to four alternative positions were used, leading to an improvement in the argumentative depth. This

finding was consistent with previous studies suggesting that the depth of argumentation contains two components, specifically the effective use of multiple types of argumentation, and a reflection of multiple positions. Both these components are essential to understand the mechanics of solving an ill-structured problem. (Asterhan & Schwarz, 2016; Özdem et al., 2017; Verberg et al., 2015). The results of the current study also provide additional evidence to indicate that argumentative depth appears to be strongest when dialectical prompts are used in combination with multiple alternative positions. The practical implications of the results of the mediation analysis are considered in a later section of this chapter.

Research Question 3

The verification strategy refers to various attempts to substantiate a claim through some form of inductive argumentation. The thematic analysis of the response data indicated that verification strategies appeared to be utilized in a similar way across both rhetorical and dialectical prompts. The type of prompt appeared not to be a significant factor when extracting examples of text to identify verification. Inductive arguments were based on company objectives, informed personal opinions with reasons, explicit or implied theories or business models, and case-based factual information. The arguments were verified in response to both types of prompt utilizing case study data, or rational conclusions drawn from previous experience or education. Both types of prompts appeared to provide the necessary scaffolding upon which students could verify the answers to ill-structured problems (Xun & Land, 2006).

The thematic analysis of the qualitative data indicated that evidence strategies were the ones that varied the most. The evidence strategy refers to the use of a variety of convincing evidence for a claim. Convincing factual evidence was presented by the students in response to both dialectical and rhetorical prompts, for example using examples concerning costs or savings,

arguments already presented in the case-study, the advantages of certain actions, or descriptions of the business context or setting. Dialectical prompts did not appear to be more effective than rhetorical prompts when using the evidence strategy. The results are consistent with previous studies suggesting that the use of different types of prompt that stimulate responses based on factual evidence positively affect the subsequent quality of solutions to ill-structured scholastic problems (Oh & Jonassen, 2007).

The elaboration strategy refers to various attempts to add rich details relating to a claim. The thematic analysis of the qualitative data indicated that the type of prompt (rhetorical or dialectical) appeared to make a difference to the elaboration of arguments. Most of the sub-themes identifying the elaboration strategy (e.g., using an introductory paragraph, used to guide the remainder of the response, using opinions supported by factual evidence, demonstrating the benefits of certain actions, providing effective arguments related to successful outcomes, and discussing internal and external resources) were elicited in responses to dialectical prompts. However, elaboration strategies were found to be utilized in different ways by the students across both rhetorical and dialectical prompts. It was found that for dialectical prompts, information already provided in the case study provided the most support for the responses. However, for rhetorical prompts, prior knowledge or educated opinion guided the responses. This finding is consistent with the view that a student might demonstrate argumentation skills dialectically, through their ability to elaborate existing arguments, or rhetorically, by presenting well-connected supportive claims derived from alternative sources of evidence. Such communication skills are an important aspect of the characteristics of the business inquiry process (Morikawa, 2017). The conclusion is that the elaboration strategy combined with both rhetorical and dialectical prompts appears to provide an effective mechanism to evaluate business claims.

The rebuttal strategy refers to various attempts to refute a claim through some form of inductive argumentation. Rebuttal appeared to be utilized slightly more in response to dialectical prompts than rhetorical prompts. The dialectical prompt appeared to be more effective when using factual evidence based on the case study. Disagreements were supported mainly by personal opinions. Rhetorical prompts were more effective than dialectical prompts when considering drawbacks. Problems could be identified using both types of prompt. Agreements were supported by facts provided in the case study, whilst disagreements were more often supported by opinions. These findings are consistent with previous studies concluding that rebuttal is an important strategy in instructional/learning methods that make use of student-centered instruction to solve problems (Gonzales & Nelson, 2005). This finding supports the conclusion that rebuttal strategies call on different communication skills, that can only be achieved through different argumentative strategies, and therefore rebuttal strategies need to be taught in practice through different instructional/learning methods (Baars, Van Gog, de Bruin, & Paas, 2017; Shute, Wang, Greiff, Zhao, & Moore, 2016; Timmers, Walraven, & Veldkamp, 2015).

Overall, the results of the qualitative analysis of the students' responses indicated that a prompt or trigger is essential to stimulate argumentative strategies and, more particularly, to orient thinking towards different points of view that are essential to accomplish effective argumentation (Byun et al., 2014; Huang et al., 2015). Dialectical prompts may sometimes engage cognition in such a way as to improve the effectiveness of argumentation. A dialectical argumentative prompt appears to motivate students to think more about various convincing viewpoints and perspectives, other than simple factual evidence, as they utilize argumentation to support a claim (Stapleton & Wu, 2015). Students who provide the highest quality solutions to

ill-structured problems are those who use scaffolding from cues and who think about different alternative potential solutions (Stark, 2013).

Implications

The main conclusion of this study is that a strong relationship exists between argumentative prompt type and argumentative depth which is mediated by alternative positions. This conclusion has theoretical implications, because it supports cognitive flexibility theory (CFT) and case based theory (CBT) positing that case studies are appropriate for measuring argumentative depth as part of a solution to an ill-structured academic problem. The multiple case studies provided students with opportunities to re-experience problems from different perspectives and examine multiple facets of each situation (Bergstrom et al., 2016; Spataru et al., 2016; Spiro et al., 2003). The results also support instructional design theory which posits that appropriate pedagogical scenarios are essential to create meaningful experiences to help facilitate learning most effectively (Branch & Kopcha, 2014). The pedagogical scenario of using argumentative prompts to elicit more alternative positions and/or higher-quality responses to ill-structured problems in the current study supports ID models and processes that incorporate specific instructional goals, focuses on real world problems, uses empirical information (i.e., case studies) at the heart of the design, and applies reliable measurements to estimate performance.

The practical implications of this conclusion in the context of educational settings are based on the assumption that educators do not use a theoretical model in practice to explain or understand why or how prompts elicit more alternative positions and/or higher-quality responses to ill-structured problems. Educators need more specific and pragmatic guidance about which kinds of prompts might be more useful than others to enhance argumentative depth.

Previous studies have not provided much guidance to educators (Bryum et al., 2014; Golanics & Nussbaum, 2008; Cho & Jonassen, 2002; Huang et al., 2015; Oh & Jonassen, 2007; Xun & Land, 2006) concluding only that argumentative prompts, irrespective of their type, appear to act as triggers that guide student engagement when confronted with an ill-structured problem learning task. Other studies have concluded only that the function of different argumentative prompts is the same, specifically to enhance the opportunities that problem-solvers will accomplish argumentative depth in their proposed solutions to an ill-structured issue (Liu & Stapleton, 2014; O'Hallaron, 2014; Polio & Shea, 2014; Qin & Uccelli, 2016; Stapleton & Wu, 2015; Yoon & Polio, 2017). Harney et al. (2015) identified many alternative types of prompt, including guiding questions, hints, clues, sentence openers, which could be classified as either task-level (focusing on elements of a problem) or process-level (to encouraged the student to take a broader process-oriented view of the problem. The process-level prompts produced greater reflection and deliberation, increased overall collaboration, greater consensus, and improved self-efficacy within the group. However, these researchers failed to operationally define argumentative prompts in a manner specific enough to be of practical use to educators. In the absence of such information, teachers in any domain in which ill-structured problems exist lack the appropriate guidance about how to present an ill-structured lesson to their students. The ultimate consequence of this lack of knowledge is that students might fail to achieve the depth of ability of argumentation that they might attain with the guidance of the correct prompt. There is a possibility that such students will enter the workforce with suboptimal argumentative or thinking skills (Byun et al., 2014; Huang et al., 2015).

Both instructional designers and educators currently face the challenge of the extent to which specific types of argumentative prompts affect the depth of an argument and whether or

not such prompts affect the quality of a solution generated to solve an ill-structured problem. An important accompanying question is whether argumentative prompts generally succeed at improving student arguments and solutions, particularly when using multiple alternative positions exist (Dali, Lau, & Risk, 2015). The findings of this study indicated that the type of prompt (rhetorical or dialectical) appeared not to strongly stimulate alternative positions when using verification or evidence strategies. Both rhetorical and dialectical prompts may be used by educators in practice as mechanisms to prompt effective argumentation based on factual evidence that can be verified. This finding has particular implications with respect to the advancement of academic instruction using information and communication technology, for example, when students are required to use online search engines, websites, and databases to collect and verify factual evidence (Crowe, LaPierre & Kebritchi, 2017).

The type of prompt appeared to make a difference to the quantity and quality of the responses associated with rebuttal and elaboration strategies. For example, dialectical prompts appeared to be most effective when refuting factual evidence and when presenting personal opinions that refuted factual evidence, whereas rhetorical prompts appeared to be most effective when arguing about drawbacks and disagreements. Most of the sub-themes identifying the elaboration strategy were elicited in responses to dialectical prompts. The use of both rhetorical and dialectical prompts to stimulate rebuttal and elaboration strategies, and to take alternative positions, required the students to apply a wide range of communication skills, which are essential skills for students in the field of business studies (Morikawa, 2017).

Practical Implications for Instructional Designers and College Instructors

Two potential practical implications and one recommendation for instructional designers and instructors that are drawn from the findings of this study are presented in this section. First,

the current study indicates that rhetorical and dialectical prompts in case-based learning environments is an effective instructional strategy to enhance students' argumentation skills and elicit argumentative depth. In specific fields, such as business, law, and education, and especially in graduate programs, instructors have been using case studies. Instructional designers and instructors tend to pair case-studies with instructional strategies, such as graphic organizers, directions, and scripts, along with having students engaged in hypothetical problem situations, such as simulations, role-plays, and debates (Tawfik & Jonassen, 2013). A practical implication of this study for instructional designers and educators is to pair the case studies with argumentation prompts. It is important to note that the students in this study were enrolled in a graduate program and the case study/prompt activities were offered after mid-semester and when significant content relevant to the cases had been covered. It is important that the case studies are relevant to the content and appropriate for the course and students' level, so students can use prior knowledge and/or experience with content to develop their arguments when answering the prompts.

Secondly, argumentation prompts can be used as scaffolds for argumentative depth since they stimulate learners to engage in argumentation strategies such as verification, elaboration, rebuttal, and evidence while triggering them to consider and generate alternative positions. In a case-study based learning environment, instructional designers and instructors can utilize both rhetorical and dialectical prompts as scaffolding tools, by introducing the prompts subsequently. They can start with a rhetorical prompt followed by a dialectical on the same case or possibly use rhetorical prompt for one case study and dialectical for a different one of similar complexity and content. Both prompts on the same case can be introduced subsequently in different types of activities with additional information (content knowledge, alternative positions) to be introduced

after the rhetorical prompt and before the dialectical. This method allows students to go back and look at their responses to the different types of prompts and compare them.

Finally, a recommendation for practical application and future research is adding the rubric that was utilized in this study with the argumentation prompts in the case-based activities. There is evidence that rubrics help students construct better arguments (Lu & Xhang, 2013). The rubric used in this study contains the necessary argumentation strategies students should display, which are verification, rebuttal, evidence, elaboration (Gonzales & Nelson, 2005; Morikawa, 2017; Oh & Jonassen, 2007; Xun & Land, 2006). Scaffolding can be implemented and organized in six stages: (1) defining the problem, (2) determining what information is needed, (3) finding the needed information, (4) organizing the information, (5) developing a claim or claims, and (6) linking the evidence to the claims (Ballard, Glazewski, & Richardson, 2011). Presenting the rubric alongside the argumentation prompts, both rhetorical and dialectical, can help students identify the problem and question what is important in the case study that contributes to the development of their arguments, or what connections exist among the claims in the case and the prompt (Bryum et al., 2014; Golanics & Nussbaum, 2008; Cho & Jonassen, 2002; Huang et al., 2015; Oh & Jonassen, 2007; Xun & Land, 2006); however, more research is needed for this type of use of the recommended rubric as an addition to the argumentation prompts as a scaffold in case-study learning activities. The recommended process for using argumentative prompts as an instructional strategy with ill-structured case studies is outlined by the flowchart in Figure 5.

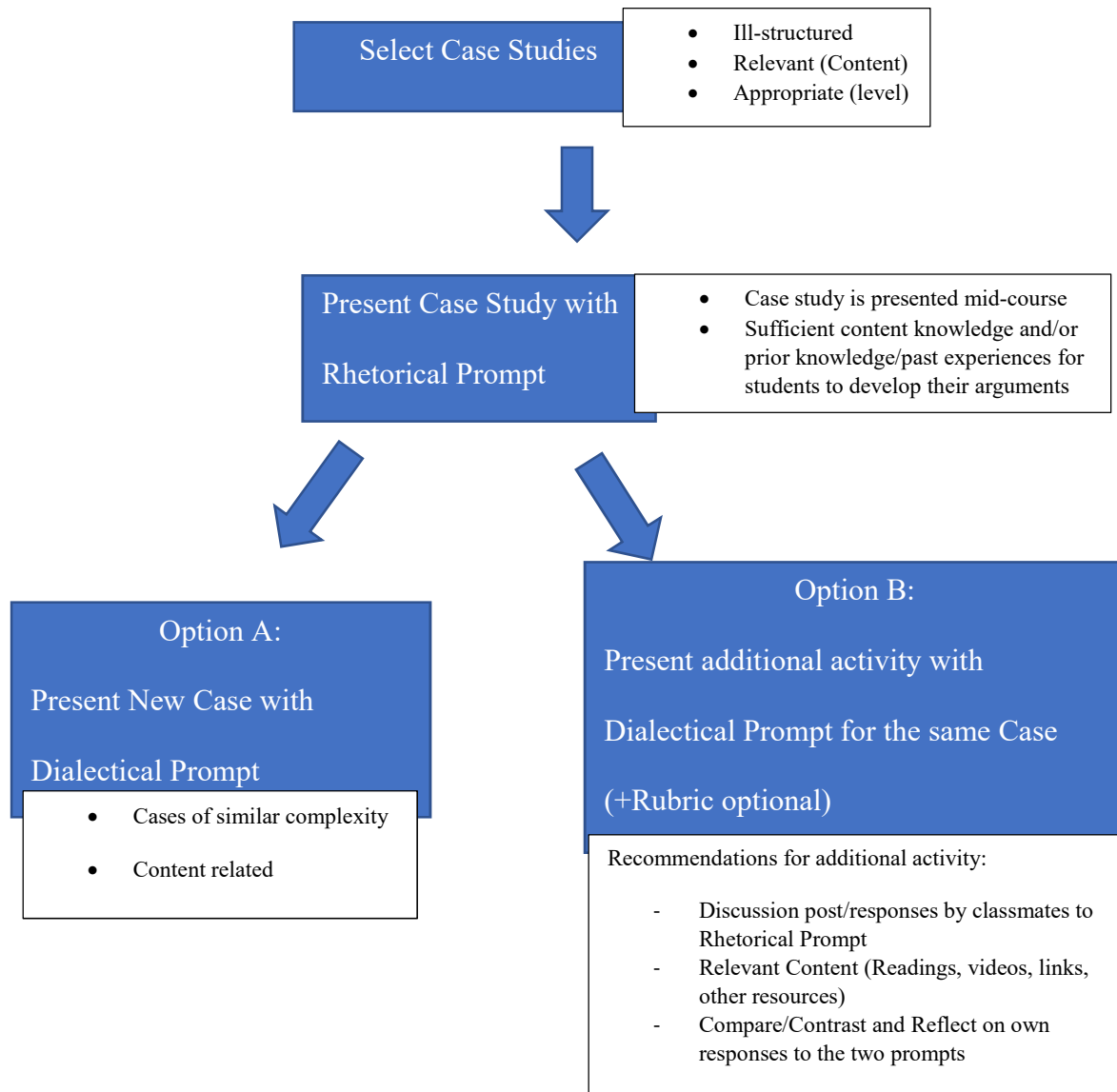


Figure 5. Argumentative Prompts Instructional Strategy Flowchart

Limitations

Ill-structured academic problems are ubiquitous in most academic courses in business, law, medicine, psychology, education, humanities, and other domains (Byun et al., 2014; Collins et al., 2016; Gallagher, 2015; Riis et al., 2017; Shin & Song, 2016). In many courses, ill-

structured problems often appear in the form of case studies to which a student is asked to respond (Bergstrom et al., 2016; Spataru et al., 2016). Depth of argumentation and the diversity of types of argumentation demonstrate the students' acquisition and development of problem-solving and communication skills in every academic discipline (Asterhan & Schwarz, 2016; Condit, 1994; Cooper & Oliver-Hoyo, 2016; Liu & Stapleton, 2014; Özdem Yilmaz et al., 2017; Tawfik, 2017; Zorwick & Wade, 2016). However, the results and conclusions of the current study were based only on a small set of data concerning the depth and type of argumentation collected from one class consisting of 16 students in the context of business studies. Therefore, the results and conclusions of the current study do not exhibit external validity, because they may not necessarily be generalizable to students in other educational contexts.

The other limitation of this study is that the effect size of the mediator model indicated that a proportion of the variance in argumentative depth was unexplained. Some of this unique variance could potentially be explained by extraneous factors that might influence how learners provide solutions to ill-structured problems. These factors might include other types of argumentative prompt, strategy and position, as well as the inherent variability in the problem-solving and communication skills of the students, many of which were not explicitly identified, measured or observed in the current study.

Due to the limitations outlined above, if the results of this study could be compared and contrasted with the results of other studies using samples of students at other academic levels and/or across a wider range of academic disciplines, then it is possible that different conclusions might be drawn.

Recommendations for Future Research

Future research is recommended to corroborate the findings of the current study, and to generate external validity, by using larger sample sizes of students across different academic levels (e.g., freshman, senior, master's, doctorate) and across a wider range of academic disciplines. Furthermore, more research is recommended to identify the many other potential factors that might influence how learners provide solutions to ill-structured problems, and contribute to the variance in argumentative depth. Argumentation is a very diverse activity in which students attempt to decrease or increase the acceptability of one or more ideas via cognitive reasoning (Baker, 2002, 2003; Walton, 2006). Diverse types of argumentation are needed to resolve conflicts and are central to scientific thinking (Lazarou et al., 2016; Liu & Stapleton, 2014; Özdem Yilmaz et al., 2017; Tawfik, 2017; Zorwick & Wade, 2016). Consequently, alternative types of argumentation could be incorporated into future research, such as counterclaim and confirmation (Oh & Jonassen, 2007), as well as alternative types of prompt, such as elaborated and unelaborated (Golanics & Nussbaum, 2008). Furthermore, the effects of the direction of argumentation (e.g., positive or negative) on argumentative depth could be studied in more detail. However, focusing on direction is complicated because it involves opposing objectives, and is unpredictable due to inherent opposing differences in the specific viewpoints and mindsets of individuals (Lefstein & Snell, 2014; Lefstein, 2018).

Finally, the effects of student-specific factors on the variance in the frequency of positions and the argumentative depth also need to be taken into account. These factors include the students' lack of prior knowledge, and/or the students' lack of ability to respond to the prompt during the problem-solving process. These factors, which were not taken into account in the current study, were exemplified by those students who did not present effective arguments,

even though they attempted to explain why they were correct, or else they expressed agreement or disagreement, without supporting their arguments with a specified argumentative strategy.

The final conclusion is that further research is essential to provide more comprehensive insights into the relationships between the type of argumentative prompt and argumentative depth, the mediating effect of the frequency of alternative positions on the relationship between argumentative prompt type and argumentative depth, and the extent to which different types of argumentation strategies are utilized within alternative positions.

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APPENDIX A: BUSINESS CASE 1

Harish Hande and the company he founded, SELCO, provide solar electricity for lighting and power to India's poor. For the work of his company, Hande has received numerous recognitions; he is frequently cited as one of the top social entrepreneurs in India and an example for the entire developing world.

The road to SELCO's success, however, has not always been smooth. Hande cofounded SELCO (with Neville Williams) in 1995 to sell and service photovoltaic (PV) systems in his home state of Karnataka, India. During its initial years of operation, the company expanded deliberately as it gained capital and experience. Then in an ill-fated attempt to scale-up during the early 2000s, SELCO created a franchised dealer network, seriously hurting the company financially and deviating from its mission to help the poor. As the company was recovering from this move, the price of solar panels spiked, and sales declined. Investors put pressure on Hande to lay off employees and contract the organization.

With the help of the World Bank's commercial finance arm, the International Finance Corporation (IFC), Hande was able to restructure the company in 2008. SELCO remained a for-profit business, but Hande was able to seek new investors more aligned with its mission. In addition, Hande was able to keep his sales and service organization intact, complete with its core of highly motivated employees.

Most importantly, SELCO was able to continue devising innovative solar solutions. The company had become known for redesigning off-the-shelf solar electric components to suit the specific needs of the urban and rural poor. The SELCO design process began with an extensive needs assessment of a targeted segment or activity. Whether designing for street vendors, midwives, or rural farmers, SELCO created solutions for the identified needs of its target market.

Sometimes this meant redesigning the solar equipment and sometimes this meant restructuring activities so that solar energy could power a client's needs.

From his field research, Hande realized early in SELCO's history that the success of solar installations for the poor would depend on designing creative financing solutions for its customers. Many thought the capital expense of purchasing solar panels and batteries put this technology out of the reach of those at the bottom of the income-generating pyramid. But, SELCO spent time cultivating India's banks and microfinance organizations to convince them of the efficacy of solar power. Over time, the company formed partnerships with these institutions to craft financial instruments that allowed entrepreneurs and families to repay the capital expenses associated with installing solar equipment.

However, SELCO's careful process of needs assessment, design, financing, and service was time-consuming and costly. The company had provided energy solutions for over 100,000 households in its fifteen years of existence, allowing customers to increase their income and quality of life. However, India's developmental problems were daunting; over 400 *million* individuals were in poverty. Observers frequently wondered if SELCO's activities could be scaled up to extend solar energy's benefits to more people.

In 2009, SELCO was considering its plans for how the company might expand. The company decided to institutionalize its design process by building an innovation center. SELCO also added products that provided energy solutions beyond solar. Some within the company were hoping the company would go "deeper" and look at designing solutions for even poorer members of the Indian population. Others were hoping that the company would go "wider" and expand beyond its current geographical areas in Karnataka and Gujarat. Whatever its direction, the

strategic choices the company made at this point in its evolution would be crucial to determining its continued success. (Yale School of Management, 2018, p. 1).

APPENDIX B: PROMPTS FOR CASE 1**No Prompt**

Please respond to the directions below in writing an essay based on the business case you have just read:

*Discuss what you believe to be salient in this business case.

Rhetorical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*Do you agree with SELCO's approach to marketing? If you were the VP of Marketing, how would you recommend that SELCO improve its efforts?

Dialectical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*In 2009, SELCO was looking at several options for expanding its operations (i.e. geographical expansion, serving poorer segments of the population, product-line extension). What are the costs and opportunities associated with each option? Which direction(s) would you recommend to Hande as the most promising? Consider the arguments for and against all alternative options.

APPENDIX C: BUSINESS CASE 2

Due to the growing client base, Elden Holdings has decided to shift to a decentralized model of business over the past two years. As the company continues with supporting more customers in more areas, the management of its staff has increasingly become difficult a task. Until presently, most of the firm's internal requirements like reporting, payroll processes as well as management of the resources have been performed through the legacy mainframe systems. As the staff continue to increase in size, the legacy mainframe systems also appear to be increasingly insufficient to be in a position of adequately managing those processes and activities of administration.

This shortcoming is exhibited in the higher costs together with the rising employee turnover that has been experienced over the past one year. For the purposes of being in a good position to properly manage the company's management, decrease costs of operations and enhance employee turnover, the company must move to a web-based application. As such, the workers will assume a bigger role in the administration of their management matters, have the needed access to the timesheets online in a secure manner, and the firm can administer its management from a central platform.

APPENDIX D: PROMPTS FOR CASE 2

No Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*Discuss what you believe to be salient in this business case.

Rhetorical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*Do you agree with Elden Holdings' approach to proposed administrative management? If you were the Manager of the company, how would you recommend wished that status quo remains?

Dialectical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

During the last year, Elden Holdings' got more concerned about its administrative challenges in terms of employee management, cost of operations and expanding the client base, the two options at hand was maintaining the decentralized system of administration and increasing the number of employees, and the second one to move to a more centralized administration that is web-based. If you were the Managing Director of the company, would you have chosen to maintain the decentralized system of administration and increasing the number of employees, or moving to a more centralized administration that is web-based? Consider the arguments for and against all alternative options.

APPENDIX E: BUSINESS CASE 3

Due to the growing client base, the Coca-Cola Company has been very concerned on how their retailers are conducting their business. As the company continues with supporting more customers in more areas, the management of its staff has increasingly become difficult a task. Until presently, the company is well concerned on the sales that they are making and if or not their retailers are affecting the amount of sales. Because there are other companies that are increasingly entering into this market, the style which different retailers are conducting their business may affect their sales.

This shortcoming is exhibited in the higher costs together with the rising employee turnover that has been experienced over the past one year. For the purposes of being in a good position to properly manage the company's management, decrease costs of operations and enhance employee turnover, the company must control the way retailers are conducting their business. As such, the retailers will be made to sale the Coca-Cola products at a flat rate regardless of the place and the person being sold to.

APPENDIX F: PROMPTS FOR CASE 3

No Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*Discuss what you believe to be salient in this business case.

Rhetorical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

*Do you agree with the Coca-Cola Company's case to monitor on how retailers should conduct their business? If you were the Manager of the company, how would you recommend wished that status quo remains?

Dialectical Prompt

Please respond to the directions below in writing an essay based on the business case you have just read:

During the previous years, the Coca-Cola Company got more concerned about the issue of reduced sales in their company, cost of operations and expanding the client base, the two options at hand was meant to ensure that the retailers were conducting their business in according with company's regulation. If you were the Managing Director of the company, would you have chosen to monitor how the retailers were conducting their business or which strategies will you employ to ensure that the company was making better sales. Consider the arguments for and against all alternative options.

APPENDIX G: RATER RUBRIC (BASED ON DEANS, 2017)

First, please grade each essay on each of the following criteria, using the scoring key of 1 = unsatisfactory, 2 = minimal proficiency, 3 = moderate proficiency, 4 = excellent.

1. VERIFICATION: The essay contains an attempt to verify a claim through some form of inductive argumentation. *Add 1 point for every added claim that is verified.*
2. REBUTTAL: The essay contains an attempt to rebut a claim through some form of inductive argumentation. *Add 1 point for every added claim that is rebutted.*
3. EVIDENCE: The essay contains convincing evidence for a claim. *Add 1 point for every added claim for which evidence is presented.*
4. ELABORATION: The essay contains rich detailed related to a claim. *Add 1 point for every added claim for which elaboration is presented.*
5. STRUCTURE OF PAPER: *For each distinct argument cogently integrated into the essay, rather than 'tacked on,' add 1 point.*

VITA
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EDUCATION

Doctor of Philosophy in Instructional Design and Technology Old Dominion University, Norfolk, VA	<i>December 2019</i>
Certificate in Advanced Education Leadership Harvard Graduate School of Education, Boston, MA	<i>Expected 2020</i>
Master of Arts in Educational Technology Michigan State University, East Lansing, MI,	<i>May 2011</i>
Master of Arts in Early Childhood Education and Bachelor of Arts in Early Childhood Education Aristotle University of Thessaloniki, Thessaloniki, Greece	<i>September 2005</i>

PROFESSIONAL EXPERIENCE

Assistant Director <i>Center for Learning and Teaching- Old Dominion University, Norfolk, VA</i>	2019- Present
Lead Instructional Designer/LMS Administrator <i>Center for Teaching Innovation - The Citadel, Charleston, SC</i>	2017 – 2019
Adjunct Professor <i>The Zucker Family School of Education - The Citadel, Charleston, SC</i>	2014 - 2016
Instructional Designer/Program Coordinator / Instructor <i>STEM Center of Excellence - The Citadel, Charleston, SC</i>	2013 - 2017
Instructional Designer <i>Academic Computing & Educational services - The Citadel, Charleston, SC</i>	2011 - 2013

Professional Memberships: American Educational Research Association (AERA), Association for Educational Communications and Technology (AECT), International Society for Performance Improvement (ISPI)

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