# The Far Side of Critical Thinking: Embedding Abductive Thinking to Expand Understanding

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*Several assignments in an upper division undergraduate leadership class were designed to help students gain skill in the challenged and practicing thinking stages defined by Paul and Elder (1997). Data was collected to measure improvement in the students' ability to think critically. The findings indicated some improvement but raised new questions about how to enrich the learning experience. The paper discusses using abducting thinking to engage students in answering questions they have developed, interpreting conflicting information, addressing assumptions, and focusing on purpose. The new design provides students with the opportunity to develop effective critical thinking traits.*

The findings were in; there had been improvement in the critical thinking skills of the students in the undergraduate leadership class. As a faculty member, the results were satisfying as the goal of helping students enhance their critical thinking was achieved. Yet, reflecting on the experience that had been provided was it was sufficient to help students gain advanced skills in the thinking needed to address today's business challenges?

The purpose of this paper is to provide 1) an overview of the critical thinking activities in an undergraduate leadership class, 2) insight into the questions that the process generated for the professor, and 3) a discussion of how to enhance the development of critical thinking by integrating abductive thinking.

## CRITICAL THINKING ACTIVITIES IN LEADERSHIP

Decision Making "is the most important job of any executive … it is also toughest and the riskiest" (Hammond, Keeney, & Raiffa, 2006, p. 118). The basic process of decision making includes problem identification, information gathering, creating alternatives, and making a choice (Moore, 2010). Accomplishing this process effectively requires that decision makers resolve conflict among competing ideas (Martin, 2007a) and critically evaluate assumptions and information (Helsdingen, van den Bosch, van Gog, & van Merrienboer, 2010).

As such, critical thinking is central to engaging in the decision making process (Moore, 2010) and is a critical skill for business. Related to incorporating critical thinking into business education, the Hart Associates Report (2013) found that 93% of the employers surveyed agreed that, "a candidate's demonstrated capacity to think critically, communicate clearly, and solve complex problems is more

important than their undergraduate major" (p. 1). The combination of these points support embedding critical thinking in a course focused on leadership processes and complicated decision making.

## PEDAGOGICAL DESIGN

The National Council for Excellence in Critical Thinking (n.d.) states that critical thinking is "conceptualizing, applying, analyzing, synthesizing, and/or evaluating information" (para. 2). Critical thinking is also "the conjunction of knowledge, skills and strategies that promote improved problem solving, rational decision making and enhanced creativity" (Reid, as cited in Reed & Anderson, 2012, p. 52). Paul and Elder (1997) use a stage theory for critical thinking. Their thinking stages are:

- Unreflective – are unaware of thinking
- Challenged – have some initial awareness of their of thinking
- Beginning – acknowledge they have thinking issues and begin to address them
- Practicing – can systematically address thinking problems
- Advanced – have the ability to effectively evaluate their thinking strengths and weaknesses
- Master – have the ability to engage in continuous improvement of their thinking

These three critical thinking approaches helped to frame the critical thinking activities developed for an undergraduate leadership class. The concepts were also used to develop a leadership rubric that would be used with the two of the three assignments. The rubric is presented in Appendix A.

A focus on critical thinking was used in two sections of an organizational leadership course. Each section had 30 students. The profile of the classes had a comparable mix of majors, senior standing, and were 55% male and 45% female. At the beginning of the class, a brief lecture on the role of critical thinking in making decisions was given. It made very broad connections without any direct links to the activities in which the students would be engaging.

Three activities were embedded across the semester. Each activity provided opportunities for students, individually and collaboratively, to reflect on their thinking. As these were upper division (senior standing) students, it was assumed that they entered the course with skill equal to the 'challenged thinker' stage. While there were opportunities to reflect at this level, the activities were designed to move to or increase beginning or higher levels.

The first activity focused on gaining insight into their leadership style. Students completed four self-assessments: the Meyers Briggs Type Inventory (MBTI), the Life-Style Inventory (LSI), an emotional intelligence survey, and a Hemispheric Mode indicator. The students used the results from these surveys to develop their integrated leadership profile. As part of this, students also had to clearly discuss the thought process that lead to their conclusions. This was designed to improve their reflective thinking skills as well as build 'beginning thinker' attributes. Feedback was provided to the students. The feedback was the first opportunity in the class to begin to focus on their intellectual humility, which is to reflect on problems in their thinking (Elder & Paul, 1996).

After the initial draft was returned with feedback, one class period was set aside for students to practice creating actions from characteristics. During other times during the semester, examples were used in class to state what type of leadership actions would result from what theory. The students were also given a one-page sample of characteristics and resulting actions. Various class team activities required students to determine the leader's actions based on various theories and situations. All of this was completed prior to the due date of the leader profile.

Following completion of the last assignment students integrated learning from the two-part case into a final version of their leadership profile. The first element of the leadership rubric was used to compare the original profile and the final profile. The results of the review indicated that for the second part there was a more detailed level of individual survey finding analysis, linking of the elements across the surveys, and how their thinking was helping them make the connections. The findings are presented in Table 1. Students anecdotally reported that they had difficulty in writing this type of reflection. There were asked

to do more than just how they felt, they were asked to analyze, reflect, and to be aware of their thought process in order to include it in the reflection. This was done to promote assessment of their thinking (beginning thinker characteristic) as well as their ability to critique their thinking (practicing thinker characteristic).

**TABLE 1**
**RESULTS OF THE LEADER PROFILE ASSIGNMENTS**

| Assignment | Well-Developed | Developed | Developing | Undeveloped |
|---|---|---|---|---|
| First draft leader profile | 0 | 15% | 10% | 75% |
| Final draft leader profile | 6% | 60% | 20% | 14% |

*First two descriptor for self-leadership used

The second assignment was a short case focused on the hotel industry. The first part of the assignment required the students to read the case, analyze three alternatives, and then choose one of the three given alternatives. Students received general feedback from the professor on the strengths and weaknesses of their choice. The feedback was, again, designed to help students develop challenged thinker humility. After submitting their choice, students were assigned the article "How Successful Leaders Think" (Martin, 2007a). From the reading, they were to identify how the insight they gained helped them to rethink the choice they made and either enhance their justification for the choice made or select another choice and discuss why they made the change. Again, the professor provided feedback on the choice and how their selection/justification had improved. This helped strengthen their analysis skills as well as, again, providing them an opportunity to think about their thinking which addresses the 'beginning thinker' stage identified by Paul and Elder (1997). The rethinking from incorporating the concepts from the article also fostered skill development in monitoring their thinking and internalization of systemically engaging in this activity. As such, they had to opportunity to engage in 'practicing thinker' skills (Elder & Paul, n.d.).

The third assignment was a complicated two-part case analysis. In this situation, the individual student was in the role of a new product manager. The company had been experiencing challenges across the production cycle from material acquisition to sales to employee morale. For the first part of the analysis, each student, outside of class, prepared an executive summary including:

- The most important assumptions and values regarding employee motivation and effective management which could be inferred from the case;
- What they thought were four of the key problems that contributed to the production problems and explain why using course concepts
- What they believe to be the most important objectives to address the problems and justify their choices using course concepts
- A discussion of how their own leadership style influenced their choices.

After students completed their part one executive summary, two class periods were set aside for the in-class learning teams to discuss part one and develop a collaborative response for the analysis, values, and objectives. Both the individual and team analyses were reviewed by the professor and feedback about the expert's opinions were provided to both the individual students and the teams.

At this point in the semester, the professor delivered a lecture providing more details related to integrative thinking from the book *The Opposable Mind* (Martin, 2007b). This lecture linked the book's concepts to three components of critical thinking: analysis, synthesis, and creativity. The lecture also clearly distinguished between elements of conventional thinking and integrative thinking.

Following the lecture, the second part of the case was assigned. For this each student prepared outside of class an executive summary:

- Identifying the most important action steps they think should be taken to correct the problems and put the operations on a track for success. Course concepts were to be used to justify their choices.
- Identifying the approaches they would use to develop their employees to improve organizational performance. Course concepts were to be used to justify their choices.
- Identifying action to be taken to open lines of communication and encourage feedback between the employees and team leaders. Course concepts were to be used to justify their choices.
- Discuss how their own leadership style influenced their choices.

During two class periods, teams discussed part two and developed a collaborative response covering the actions, leadership approaches and communication programs. Both the individual and Team analyses were reviewed by the professor and feedback provided to both the individual students and the teams. The two rounds with intervening feedback and collaborative learning were designed to provide the practice needed to develop more detailed beginning thinker skill', especially those related to the role of concepts, assumptions, inferences, implications, and points of view (Elder & Paul, n.d., Paul & Elder, 1997). The two rounds of thinking were designed to help students improve the practicing thinker trait of systematic practice by analyzing their thinking strengths and weaknesses, developing realistic plans, engaging in intellectual perseverance, and being aware of their thinking related to precision and relevance (Elder & Paul, n.d.).

The professor used the leadership rubric (Appendix A) to assess the individual and team performance on part 1 and part 2 of the case. A comparison of the two rubric application results indicated an increase in activities related to critical thinking. The individual results are presented in Table 2. The teams' performance is noted in Table 3. After receiving the feedback the teams prepared a final detailed set of recommendations, including justification for their recommendations. The audience for the report was the company CEO.

**TABLE 2**
**INTEGRATED CASE FINDINGS – INDIVIDUAL PERCENTAGES**

| | | Well Developed | Developed | Developing | Undeveloped |
|---|---|---|---|---|---|
| Self-Leadership* | 1st | 14% | 52% | 34% | 0% |
| | 2nd | 18% | 57% | 25% | 0% |
| Human Talent Leadership | 1st | 10% | 43% | 34% | 13% |
| | 2nd | 13% | 57% | 21% | 9% |
| Decision Making Leadership | 1st | 8% | 47% | 35% | 10% |
| | 2nd | 11% | 61% | 22% | 6% |
| Process Leadership | 1st | 17% | 46% | 32% | 5% |
| | 2nd | 21% | 56% | 20% | 3% |

*Last descriptor for self-leadership was used

**TABLE 3**
**INTEGRATED CASE FINDINGS - TEAM PERCENTAGE**

| | | Well Developed | Developed | Developing | Undeveloped |
|---|---|---|---|---|---|
| Self-Leadership | 1st | NA | NA | NA | NA |
| | 2nd | NA | NA | NA | NA |
| Human Talent Leadership | 1st | 14% | 60% | 24% | 2% |
| | 2nd | 15% | 65% | 19% | 1% |
| Decision Making Leadership | 1st | 12% | 56% | 26% | 6% |
| | 2nd | 16% | 62% | 20% | 2% |
| Process Leadership | 1st | 15% | 53% | 28% | 4% |
| | 2nd | 17% | 57% | 24% | 2% |

## OBSERVATIONS

This set of critical thinking projects were challenging for the students. The general difficulty with the results of the leader profile assignments was that while students did a good job at selecting characteristics about themselves, they did not have a strong understanding of how those characteristics influenced their actions even though the results of part one were considerably improved. Students noted that the self-reflection process was hard for them and that they were uncomfortable doing it. They had difficulty in taking information about themselves and reconciling their existing perception of themselves especially as they were doing so based on self-assessment results. This created a disparate understanding that made it difficult to create an overall awareness of their own perceptions, values, and behavior related to their leadership decisions.

The results of the integrated case analysis demonstrated that students had difficulty seeing how the different steps required in leading an organization must be tied together. Students were required to hold different assumptions and information and then determine what was most effective given the situation with which they were faced. And, this had to be done in the context of applying leadership theories.

Students demonstrated that they had difficulty in taking new information/knowledge, integrating it with existing information/knowledge, and then developing a new way of thinking about what needed to be done. The debrief with the class indicated that many students felt that they were making decisions based on focusing on past actions and that it was hard to see how those actions affected what the company said it wanted. For many of the students the case was constricting even when the professor explained the nature of case analysis. On one level the results of the individual case analyses were disappointing because so few students demonstrated well-developed critical thinking skills about leadership factors. On the other hand, it was encouraging that there was improvement in all of the rubric elements.

It was especially interesting to observe the team discussions. Members challenged each other's thinking. They frequently went outside the case facts and discussed what if possibilities, they debated the potential outcomes of theirs choices, and frequently linked the ideas of several members together to create a different action to recommend. In the end, the teams made good choices. Occasionally there were mixed messages in their choices, but the frequency was reduced. Once the students were given feedback and had time to work in teams their collective ability to critically analyze what was needed to create a positive environment improved. Overall, student performance met the expectations of the class -- a leader has the ability to clearly analyze a situation, identify the relevant issues/individuals, and be able to balance apparent contradictions to develop a response that will address the relevant issues.

The student comments resulted in the professor's reflection on how to redesign the activities to 1) lessen the focus on past actions embedded in assignments, 2) facilitate focusing on the constraints presented in the assignment, 3) allow for exploring how to live with or remove the constraints, and 4)

foster early in the process the positive thinking challenges conversations noted in 'after completion' team discussions. The following section discusses the planned integration of abductive thinking into the course.

## NEXT STEPS – ABDUCTIVE THINKING

Abductive thinking "suggests something that may be so … it is future-focused and based on the ability to conjure an image of a future reality that does not yet exist" (Shamiyeh, 2010a, p.127). Holding a future-focused orientation allows for a larger space for developing what is wanted rather than fixing something that is broken (Shamiyeh, 2010b).

Though not as prominent in the scientific literature as inductive and deductive reasoning, abductive thinking's creative space aligns with the focus on critical thinking by not limiting the thinking space to what is identified from only analytic analysis (Shamiyeh, 2010 a; Shamiyeh, 2020b). Abductive thinking allows for using a "creative-analytical approach to problem-solving and decision making" that incorporates interdependencies (Shamiyeh, 2010c, p. 27).

The future-focused space of abductive thinking fits with leadership as noted by Senge's (2003) belief that creation is a critical part of the work of leaders. Senge (2003) goes on to note that, "The fundamental difference between creating and problem solving is simple. In problem solving we seek to make something we do not like go away. In creating, we seek to make what we truly care about exist" (p. 4).

Abductive thinking space also allows for the systemic view needed for integrative thinking as noted by Martin (2007a): seeking the less obvious, using nonlinear relationships, seeing the whole of problems, and creatively addressing competing ideas. These are similar to the skills needed to address complex decision environments as identified by Snowden and Boone (2007). They stress the need for using patterns, creativity and competing ideas to address complex issues.

Providing students an opportunity to develop creative-analytic skills gives them a new way of thinking – one that invites them to innovate via developing new alternatives given certain parameters and constraints (Shamiyeh, 2010c). This approach allow for generating and testing solutions rather than first defining a problem and then a solution for that problem – as well as blending analysis, synthesis and creativity (Shamiyeh, 2010c), extending three elements of critical thinking.

Kolko (2010) stresses the role of abductive thinking in the personal act of sensemaking and the collaborative act of synthesis both of which are needed to understand connections. Such understanding is derived from looking for patterns and generating abstract form to thoughts that can be turned into something tangible. The abductive thinking space allows for the creation of new insight based on what has been observed or experienced.

Overall, the addition of abductive thinking and its combination of creative-analytical thinking produces a learning environment that requires students to answer questions they have developed, interpret conflicting information, address personal and team assumptions, and focus on purpose not historical behavior. In doing so, students have the opportunity to develop the systematic critical thinking and practice skills of the practicing thinker. Table 5 illustrates how incorporating abductive thinking affect the learning opportunities identified in this paper.

**TABLE 5**
**ABDUCTIVE THINKING**

| ACTIVITY | ABDUCTIVE DESIGN | COMMENTS |
|---|---|---|
| Leadership Profile | • Before completing self-assessments have students think about their ideal view of themselves as a leader.<br>• Students would write up this future vision of themselves. | • Use the survey feedback to identify any constraints to their future leadership vision.<br>• Revise profile to limit the impact of the constraints. |
| Hotel Case | • Do not give alternatives to choose from.<br>• Provide a statement of what the company wants to achieve<br>• Have the student develop alternative ways to meet this future objective.<br>• Then have the students read the case. | • Students list out behavioral and environmental dynamics in the case.<br>• Analyze dynamics for potential constraints to any of the future-oriented alternatives already identified.<br>• Use this select set to refine the alternatives and their implementation strategies. |
| Complex Case – Individual* | • Provide a statement of what the company wants to achieve operationally.<br>• Have the students develop alternative ways to meet this future operational vision.<br>• Provide a statement of what the company wants to achieve relative to its human talent.<br>• Have the students develop alternative ways to meet this future human talent vision.<br>• Then have the students read the case. | • After developing both sets of alternatives have the students use them to develop integrated alternatives – those that have the potential to meet both future visions.<br>• Students list out behavioral & environmental dynamics in the case related to each vision – individually & interdependently.<br>• Analyze these for potential constraints & use this select set to refine the alternatives and implementation strategies. |

*Teams would follow the same process

Abductive thinking expands the frame from which students can think about leadership and the interpersonal concepts associated with it. Abductive engagement encourages if-then thinking that fosters creativity. In addition, it encourages more questioning and looking for an expanded set of information, a challenging of assumptions (personal and those embedded in analytical thinking models), and thinking about purposes rather than problems. Each increases the opportunity to develop skills associated with being a practicing thinker with the foundation to move to becoming an advanced thinker (Paul & Elder, 1997). Specifically, the addition of abductive thinking fosters the well-cultivated critical thinker traits identified by Paul and Elder (2010):

- Asking relevant, well formulated questions,
- Seek relevant information,
- Generate abstract idea
- Test conclusions and solutions
- Revise thinking and solutions
- Be open minded when looking for alternatives
- Use a broader frame for assessing assumptions
- Be better positioned to identify implications of and practical outcomes of their ideas, and,
- In general be better positioned to address complicated and complex problems.

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## APPENDIX A: LEADERSHIP RUBRIC

| | Well Developed | Developed | Developing |
|---|---|---|---|
| Self-leadership | • Creates a self-leadership profile from a mix of self-assessments integrated with leadership theories.<br>• Considers a mix of leadership preferences to respond appropriately in different situations.<br>• Critiques how their leadership preferences influence their actions | • Selects preferences from a series of self-assessments to show their leadership preferences.<br>• Prioritizes preferences to identify how to respond in a situation.<br>• Can generalize how some of their leadership preferences influence their actions. | • Can distinguish among self-assessment profiles and summarize each for their own use talking about their leadership preferences.<br>• Defends actions in response to their behavior in a situation<br>• Recognizes how some of their leadership preferences influence their actions. |
| Human Talent Leadership | • Designs power tactic approaches appropriate to the situation.<br>• Constructs conflict management strategies appropriate to the situation.<br>• Constructs motivational strategies appropriate to the situation.<br>• Designs a supportive team structure. | • Prioritizes power tactic approaches appropriate to the situation.<br>• Prioritizes conflict management approach appropriate to the situation.<br>• Prioritizes motivational approach appropriate to the situation.<br>• Identifies how to lead an effective team. | • Chooses and defends power tactic used in the situation.<br>• Chooses and defends conflict management techniques used in the situation.<br>• Chooses and defends motivational approach.<br>• Chooses and defends team leadership approach. |
| Decision Making Leadership | • Develops an integrative approach for decision making:<br>1. Considers multiple issue characteristics<br>2. Constructs multi-directional causality<br>3. Supports a holistic approach to decision making<br>4. Produces creative resolutions | • Distinguishes among conventional and integrative approaches for decision making:<br>1. Priorities obvious and some not-so-obvious characteristics<br>2. Infers a mix of one-way and multi-causality<br>3. Selects a mix of independent and interdependent parts of the issue<br>4. Analyzes choices | • Recognizes and defends a conventional approach for decision making:<br>1. Recognizes obviously relevant characteristics<br>2. Recognizes one-way cause and effect relationships<br>3. Identifies decision making breaking a problem into pieces and working on them individually<br>4. Defends making either-or choices |
| Process Leadership | • Considers requirements of stakeholder in the creation of and achievement of organizational objectives.<br>• Creates an integrated process management approach that visualizes, measures, controls, and supports process improvement.<br>• Creates alignment among and within organizational processes. | • Prioritizes among stakeholder requirements in executing organizational objectives.<br>• Selects a process management approach that support analysis of process dynamics.<br>• Infers some alignment among and within organizational processes. | • Restates stakeholder requirements and summarizes their importance for some organizational objectives.<br>• Extends existing process management approaches.<br>• Expresses clearly evident alignment among and within organizational processes. |