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DEVELOPING CRITICAL THINKING WITHIN A MASTER OF SCIENCE IN LEADERSHIP PROGRAM

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ABSTRACT

Critical thinking involves an important set of competencies, skills, and behaviors that can be systematically developed and cultivated. Critical thinking is fostered within the Master of Science in Leadership Program to help students achieve higher levels of thinking through the program and also to help them improve their leadership acumen. The paper describes critical thinking, provides background on the Paulian view of critical thinking used within the program, and presents the approach used to infuse critical thinking into the curriculum. The Master of Science in Leadership Program introduces critical thinking in the first required course and weaves critical thinking concepts and exercises throughout the entire program. Program administrators and course developers incorporated desired learning points into the curriculum through conceptual frameworks, active learning activities, targeted instructional techniques, and intellectual moves. Each of those components is part of a schema that ensures students engage concepts at the highest analytical levels within their individual contexts as leaders.

Topic Area: Leadership Education

Keywords: Critical thinking, leadership, online learning, distance education, instructional strategies

INTRODUCTION

Leaders reason through emergent situations. In environments of rapid change, application of old solutions do not always work with new problems. Complex, adaptive environments require leaders who think. The Master of Science in Leadership (MSL) program incorporates critical thinking at its core. Critical thinking is considered a foundational set of competencies, skills, and behaviors that can be systematically developed and cultivated.

While critical thinking is widely recognized as important and institutions are developing instructional tools to enhance critical thinking development, academics are still puzzled on how to teach critical thinking. Many students are not aware of their thought processes and do not approach reasoning in a disciplined or systematic way (Scott, 2014). To address the gaps in our students' thought processes, the MSL provides explicit critical thinking instruction throughout the program and uses a critical thinking assessment to assess understanding of basic critical thinking skills. From a programmatic perspective, administrators are interested in ensuring that students improve their critical thinking skills and that improvements persist over the duration of the program.

The importance of having students thinking at the highest levels served as the impetus to infuse critical thinking in the Leadership program at Embry-Riddle Aeronautical University-Worldwide (ERAU-WW). The MSL is a comprehensive leadership development program.

Critical thinking is introduced in the first required course and systematically developed through each subsequent course. In the MSL program, the readings, learning activities, assignments, discussions and tests that permeate each week's activities throughout the courses and program have critical thinking components. The students begin by learning critical thinking concepts and carry those concepts through each activity outlined in the program. To expose how we have done this, we define and discuss critical thinking, provide relevant background on our MSL program, describe our approach to critical thinking in our program and explain the activities we use to teach both leadership and critical thinking concepts.

CRITICAL THINKING

Critical thinking, with origins dating back to ancient Greece, emerged as a focal point of modern education. The modern movement of critical thinking in education gained momentum with the implementation of California Executive Order 338 in 1980 and the release of the U.S. Government report, *A Nation at Risk* in 1983. California Executive Order 338 mandated critical thinking instruction in the California State University system and *A Nation at Risk* recommended critical thinking be at the forefront of all educational levels. *A Nation at Risk* reported that most 17 year old students failed at complex, logical tasks and yet those skills were needed in the workplace. The report recommended that students needed to develop advanced cognitive skills and should continue improving those skills throughout their careers (Notgarnie, 2011). The California Executive Order 338 and the *Nation at Risk* catalyzed the interdisciplinary focus of critical thinking in education. In 1990, the American Philosophical Association (APA) commissioned a Delphi study composed of a panel of educators, philosophers and scientists.

This study produced a definition of critical thinking and listed attributes of critical thinkers (Falcione and Falcione, 1996). The APA report stressed three key points, including: (a) critical thinking is a holistic phenomenon that is not domain specific, (b) critical thinking should not be conflated with other models of thinking, and that (c) developing and applying critical thinking involves interaction with the context provided by domain knowledge (Sadler, 2010). As such, the work of critical thinking in an educational context became vitally important and research of critical thinking increased significantly.

Research has served as the foundation for critical thinking, particularly since the 1980s, as writers sought to clarify the definition of critical thinking. Raternick (2005) expressed that several critical thinking meanings exist within the discipline. Paul, Elder and Bartell (1997) argued that it is unwise to rely on one definition of critical thinking because of the wide application and the 2500 years of tradition. Glasser (1941) suggested critical thinking involved considering problems from one's experience, knowledge of the methods of inquiry and the skill to apply those methods. Robert Ennis (1987) defined critical thinking as "reasonable, reflective thinking that is focused on deciding what to believe or do" (p. xviii). Lipman (1991) described critical thinking as "skillful, responsible thinking that is conducive to good judgment because it is sensitive to context, relies on criteria and is self-correcting" (p. 116). Hare (1998) referred to critical thinking as a deliberate assessment of claims through defined standards of proof. Finally, Paul (1993) called it "thinking about your thinking, while you're thinking, in order to make your thinking better" (p. 91).

The Paulian approach to critical thinking, named after Richard Paul, serves as a foundational element of the MSL program at Embry-Riddle Aeronautical University-Worldwide. Paul is known for his impact on critical thinking in education. The Paulian approach deconstructs thinking into eight constituent parts (elements; see Figure 1), which can be assessed using criteria (standards) and held up against universal ideals (virtues). The approach can be used to reason through any idea within any context.

The Elements of Thought

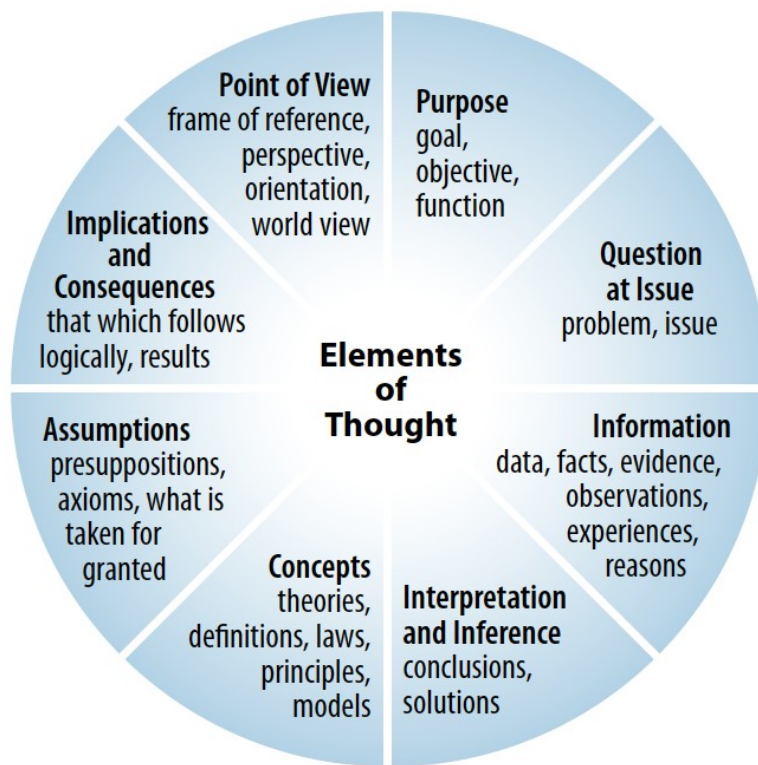


Figure 1. Elements of Thought. Reprinted with permission from *The Thinker's Guide to Analytic Thinking: How to Take Thinking Apart and What to Look for When You Do* (p. 5) by L. Elder and R. Paul, 2012, Tomales, CA: Critical Thinking Foundation Press. Copyright 2012

Paul's elements of thought are based on eight components that allow one to define thinking among a set of interrelated intellectual processes (Elder & Paul, 2012). It is not important to reason through each element in a certain order; however, because all thinking contains all of the elements, it is important to cover each element individually to serve as a framework to think about complex issues (Broadbear et al, 2000). A second concept of Paul's approach to critical thinking is

intellectual standards. These standards are used as a self-assessment tool to make thinking clear, accurate, broad, and fair (Elder & Paul, 2012). In other words, intellectual standards help keep thinking on track. These intellectual standards apply to academic thinking and have implications for everyday life. (Broadbear & Keyser, 2000; Elder & Paul, 2012).

Finally, the Paulian approach to critical thinking focuses on intellectual traits necessary for right action and thinking. According to the Foundation for Critical Thinking (1996) several valuable intellectual traits (virtues) are important to the critical thinker. As one practices critical thought, these traits become inherent in the critical thinker (Broadbear & Keyser, 2000). It is with the previous frame of reference that a discussion of the background of the MSL program is important.

MASTER OF SCIENCE IN LEADERSHIP - BACKGROUND

Embry-Riddle Aeronautical University's mission is to teach the science, practice and business of aviation and aerospace (University, 2013). Founded in 1925, just 22 years after the Wright brothers' first flight, the non-profit, private university has grown to offer academic programs in two traditional campuses located in Daytona Beach, Florida and Prescott, Arizona. The university also provides instruction around the world through over 150 satellite campuses and online. Though recognized as a leader in aviation and aerospace education, ERAU offers a wide array of academic programs in several disciplines. In Embry-Riddle's Worldwide campus, three colleges (Aeronautics, Arts & Sciences and Business) offer several courses of study.

Embry-Riddle launched the MSL degree program in 2012 with the vision of developing capable and confident leaders who will be prepared for organizational leadership in a hyper turbulent, global environment. The program was designed around six program outcomes that focus on developing a whole leader. The MSL program employed a backward design approach in curriculum development where the course learning activities were used to achieve course outcomes that are derived from the program outcomes. The intention was to create a coherent degree program focused on achieving the program objectives. The MSL is a 36 credit-hour degree program encompassing 10 core courses and two elective courses. MSL program developers believed that strong critical thinking is a foundational competency for exceptional leaders. Consequently, critical thinking was infused into the course development process.

APPROACH TO CRITICAL THINKING IN THE MSL PROGRAM

The MSL program uses a structured approach to incorporating desired learning points into the curriculum. Table 1 defines key terms used to describe the MSL program approach. The most important elements of the schema are *frameworks, techniques, activities and moves*.

Frameworks define and explain key concepts within the program. *Activities* are common assignments used to teach and assess the concepts. *Techniques* refine and develop the frameworks in a way that makes the concepts accessible to the students. Finally, *moves* to underscore key learning points and create shifts in mindset.

Table 1
Definition of critical thinking concepts with the MSL Program

Term	Definition
Activity	A unit of instruction designed to teach one or more concepts
CARS	An acronym for Credibility, Accuracy, Reliability, and Support used to evaluate a claim
Concept Map	A diagram used to develop and illustrate interrelated aspects of a concept
Elements of Thought	Eight essential components of thought (i.e., purpose, question-at-issue, information, interpretations and inferences, concepts, assumptions, implications and conclusions, point of view)
Frameworks	The concepts, theories, and models that form the basis for the content and modes of instruction
Going around the Circle	A technique to consider each of the eight elements of thought, so named because the elements are typically arranged in a circle
Intellectual Virtues	Universal principles guided by morality or justice (e.g., intellectual humility, intellectual courage, intellectual perseverance)
Intellectual Moves	Questions or practices intended to create an intellectual shift that causes students to understand concepts at a deeper level
Paulian Critical Thinking	A critical thinking framework based on the work of Richard Paul
SEE-I	An acronym for State, Elaborate, Exemplify, and Illustrate used to clarify a thought
Standards of thought	Criterion to assess reasoning (i.e., clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness)
Technique	A method of instruction that is designed to elicit certain learning behaviors while developing the concepts in a framework
QEDS	An acronym for Question, Elements, Discipline, and Standards used to remind students to consider the question-at-issue using the elements of thought, within the context of the discipline, against the intellectual standards

Frameworks

Frameworks are analytical models used to conceptualize program learning outcomes. These frameworks act as schema for students to approach and understand learning objectives. The program employs a variety of frameworks as part of the program curriculum. For instance, servant leadership is a leadership framework and transactional analysis is a communications framework taught in the program. This paper focuses on the critical thinking framework.

The MSL program primarily teaches the Paulian approach to critical thinking. Students study elements of thought, standards of reasoning, intellectual virtues, and barriers to critical thought. The Paulian approach is taught explicitly in the first three weeks of the first nine-week course. The first course is prerequisite to the eight other core courses and the capstone course. After the first three weeks of explicit instruction, the critical thinking framework is integrated into learning activities and instructional techniques so that critical thinking is infused throughout the entire curriculum. In this way, critical thinking concepts remain at a conscious level.

Activities

Learners are exposed to Paulian Methods through multiple activities that extend through the MSL program. The course designers developed common instructional activity types as the main tools for teaching and assessing students. The activity types are used for all instruction, not just critical thinking instruction. Readings are used to explore scholarly points of view on course concepts. Discussion questions provide an informal opportunity for students to interact with students and professors. Reflection blogs enable students to journal about how concepts relate to their lives. Case studies develop insight into how others have operated. Annotated bibliographies, literature reviews and papers are used to formally research and develop concepts. Presentations provide students opportunities to share their work in creative ways. Team activities offer students the opportunity to work more deeply with their peers. Concept mapping is used to explore the systems nature of concepts. The way these activities relate to critical thinking instruction is explained below.

In order to develop a baseline of critical thinking understanding, we provide direct instruction in basic critical thinking concepts and definitions for the first three weeks of the introductory course. During those first three weeks, students read *Learning to Think Things Through: A Guide to Critical Thinking across the Curriculum* (Nosich, 2012). The book is used as a textbook and helps establish the student's preliminary understanding of critical thinking.

Initially, students are asked to consider prominent definitions of critical thinking (Ennis, Lipman and Paul mentioned above) and to derive their own definitions based upon their own experiences, class discussions, and course readings. Students develop their thoughts about how these definitions differ, what might be missing or how the specific words are used in the various definitions. At this point in their study, the students have not been exposed to how to explicitly review a definition using critical thinking elements and standards. Consequently, most students develop a critical thinking definition derived from the presented definitions and that does not contain original concepts. Once learners have reviewed the definitions of critical thinking and started to read through the Nosich (2012) text, they are introduced to the instructional activities:

Discussion questions allow students an opportunity to examine aspects of course concepts. The students respond to a prompt that relates to one of the course activities and then engage with their classmates in an interactive discussion of the material. Other students can then provide supporting or counter-examples from their own experiences. Some discussion questions relate directly to critical thinking concepts and terminology, while other questions invoke critical thinking techniques in the discussion.

While discussion questions are public, reflection blogs are more private. Students are asked to journal about various concepts using reflection blogs. The blogs challenge the students to extend their thinking by applying concepts to their personal and professional experiences. The activity allows for reflection, deepening connections and applications for the leader's thinking.

Case studies are developed around short readings on leadership or organizational design challenges. The students use a systematic approach to analyze, evaluate, diagnose, and provide solutions to case challenges. Cases have ambiguous situations requiring learners to resolve

complexities and apply course learning material in novel ways. Students are challenged to think through cases thoroughly so that they do not dismiss potential solutions.

Students prepare annotated bibliographies using the elements of thought as the framework for the annotations. The elements of thought provide a suitable map for ensuring that the student annotates a source systematically and fully. Students describe a leadership article using the technique. They look at the author's point of view and purpose for writing the article. They consider the question at issue within the context of the leadership discipline. They review the facts and information available; evaluate the author's assumptions, and consider the implications and consequences of the author's reasoning. They look for overarching concepts within the literature review section. Finally, they evaluate the conclusions and interpretations. Instructors use the standards of reasoning to evaluate how well the student developed each element.

Literature reviews develop the student's ability to identify, review, evaluate, and synthesize scholarly sources. Learners choose leadership articles relevant to their particular interests and projects. Critical thinking is required to synthesize multiple sources effectively into a comprehensive review of the literature. Learners also must place their sources into a matrix form, which helps them learn to synthesize using a visual format.

The MSL Program requires papers formatted based on the style manual of the American Psychological Association. Assignment length is dependent upon the particular learning objectives for the activity; many papers fall within the range of 1000 to 1500 word count.

Students are encouraged to use the elements of thought as a general framework for their papers to ensure that they have adequately covered the material. Writing is one of the most effective ways for students to develop their thoughts into coherent, well-reasoned positions.

Learners develop and deliver presentations that present their findings, propose new strategies, or showcase specified information. Presentations encourage students to be creative, clearly articulate their ideas, and present concepts concisely and persuasively. Students learn to use new technologies and to avoid text-rich, bullet-heavy, presentations.

Some MSL Program activities are completed in teams. The activities are essentially the same as the individual activities except that the learners must develop a team charter in which they outline their roles, responsibilities, and commitments. The team activities are designed to create learning communities and cause the learners to navigate through the complexities introduced in a team environment. Learners are encouraged to confront biases, fallacies, and key intellectual standards as part of the team formation process and throughout the group activity. Learners develop important communication, leadership, and team building skills.

Concept maps are used throughout the program in a variety of activities. Maps are used to outline assignments; clarify and construct concepts; categorize, group and relate ideas as systems; connect and scaffold prior knowledge with course concepts; and explore possible connections. Additionally, concept maps are used to manage projects, tasks, and file structures.

The MSL Program activities are often ambiguous enough to allow students to develop and select the techniques they will use to accomplish the activity objectives. The ambiguity is intentional and, at times, causes dissonance with the students. Students often desire to be told exactly how to accomplish their objectives. The intention of the ambiguity is to persuade learners that life and leadership do not lend themselves to tidy answers or provide explicit instructions on

how exactly to achieve an A grade. Learners struggle with the concept and are often unable to grasp that meaningful learning may be more important than the grade they obtain in the course.

All of the activities are graded using customized rubrics that contain critical thinking components. For example, discussion questions and papers are graded to ensure that students adhered to standards of thought and that students gave appropriate coverage to each element of thought.

Learners take the Critical Thinking Basic Skills Assessment (Thinking, n.d.) four times during the MSL program. The assessment is not graded as part of the coursework and is used to provide an external benchmark for the learner's knowledge. We have not been able to collect reliable data to perform descriptive statistics on student performance. We intend to use the information to improve the integration of the critical thinking concepts into the curriculum.

To summarize, frameworks are concepts that we want to teach and activities are common instructional methods used across the program. We now turn our attention to techniques.

Techniques

Techniques are used to further explicate and develop the frameworks and to accomplish the work of the activities. Techniques are usually specific to an educational objective. As an example, a SWOT analysis is a common business technique for evaluating the strengths (S), weaknesses (W), opportunities (O), and threats (T) of a project. A SWOT analysis would be appropriate to evaluate the feasibility of a marketing campaign but would not be effective to conduct a breakeven analysis for a new product.

We develop the critical thinking framework using the specific techniques of going around the circle to capture each of the elements, assessing the thinking using the standards of reasoning, using the SEE-I technique to improve clarity, reading critically to ensure understanding, writing critically to aid expression and develop coherence of thought, mapping concepts to develop a systems approach, using QEDS to develop thinking within the discipline, and using CARS to evaluate Internet resources.

- 1. Go around the circle to capture each of the elements: Going around the circle is a method used to ensure that each of the eight elements of thought are considered for the question at issue. It is not important to consider each element in a certain order; however, because all thinking contains all of the elements, it is important to cover each element individually.*
- 2. Assess the thinking using the standards of reasoning: Critical thinking is assessed against nine key standards of reasoning: clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness. MSL Program thinkers assess their thinking by examining their thinking against each standard.*
- 3. Use the SEE-I technique to improve clarity: SEE-I is used to clarify a thought by developing the thought beyond the initial statement. Elaboration provides additional context to the initial statement that might be started with the statement "In other words...." Generally, students are instructed to elaborate in four sentences or more. The example helps to increase understanding with a concrete exemplar that limits misinterpretation. The concept is illustrated with a simile, metaphor, model, or some illustration that is representative of the idea.*
- 4. Read critically to ensure understanding: Critical reading entails carefully reading material using the critical thinking framework to analyze and assess the material. The reading is reviewed for*

coverage of the elements, assessed using the standards, and evaluated against intellectual virtues and barriers to thought.

5. *Write critically to aid expression: Critical thinking skills are developed through writing exercises. Students go around the circle and ensure that they have discussed each element of thought. They hold their writing up against the standards and consider whether their writing exhibits barriers to thought.*
6. *Concept mapping to develop a systems approach: The MSL Program uses a concept mapping software program that allows ideas to be connected to multiple other ideas using parent, child, and cross-link relationships. The concept map is used to show that leadership concepts are interrelated and exist within a system. The software program automatically recognizes when a word has been used and provides a prompt to the user to create a cross-link to the previous concepts. It is useful to map the elements of thought for a particular idea.*
7. *QEDS to develop thinking within the discipline: The QEDS approach is used to examine a question, thinking through each element of thought within the leadership discipline while applying the intellectual standards to their thought processes. This approach is used to emphasize the need to think through ideas within the leadership discipline or within a leadership context. This is useful to help the thinker consider context and point-of-view carefully as well as consider a slightly different question at issue if necessary.*
8. *CARS to evaluate Internet resources: CARS is a simple approach for evaluating Internet sources. The source is examined for evidence that the author has made a credible claim that appears to be trustworthy and to determine if the information presented appears to be accurate, relevant, and complete. The source is examined for reasonableness to determine if the claim was presented evenly, in a fair and unbiased manner. Finally, the source is examined to determine if the claim can be corroborated using other sources or the documentation supplied. The CARS approach is not rigorous, but can be used to quickly evaluate an Internet source.*

The techniques are effective in assisting students develop a better understanding of how concepts are constructed. A challenge for professors is to ensure that students connect the purpose of the techniques with the desired learning outcomes. That connection helps the student see the bigger picture and also prevents students from developing the perception that they are wasting their time on useless assignments. The program does have some built-in assurances that students will understand the connections through the use of intellectual moves.

Moves

An intellectual move is used to help students understand concepts. The idea behind the moves is that they challenge the learner to engage the material at a different level. Instead of intellectualizing a concept, the learner is asked to play with the concept in a way that makes it more real and more accessible. A move is typically a question that invites the learner to confront a potential bias or block. Moves are essentially a form of Socratic questioning that creates a rich possibility for deep interaction between students and professors. Table 2 provides a sample of intellectual moves and describes the purpose and intended result of the moves.

Table 2
Representative Intellectual Moves

Move	Purpose	Result
Would you be happy to learn your surgeon had the same study habits that you have?	Challenges the learner to think about whether study habits are suitable.	This can be a trigger that study habits need to be improved
Do you have the intellectual perseverance to complete this program at a high level?	Causes the learner to consider intellectual perseverance as prerequisite to success.	The learner is challenged to commit to the intellectual perseverance required to excel in the program.
Is the value of your degree program diminished if social loafers successfully complete the program?	This question causes the learner to feel indignation towards people who do not provide sufficient effort.	Increases commitment, intellectual perseverance, and recognition of value of degree.
Describe what you will have learned in the program by the time you complete.	This question puts learners into a forward thinking mode.	Learners starts to design their own learning objectives; they start to challenge or adopt given learning outcomes.
How can you immediately put this knowledge that you have learned in this activity (course or program) to use in your work or your life?	Reinforces immediate, positive, and actionable result from the activity that can be applied to the learner's situation.	Learner incorporates active learning into environment.
What were the three most important things you learned in this activity (course or program)?	This question causes the learner to reflect on the value of the learning experience.	Reinforces positive learning outcomes and engages reflective behavior.
How did your previous knowledge or experience benefit your classmates?	Reminds students that their knowledge, experiences, and stories are a primary means by which their classmates are learning.	Puts pressure on learners to ensure they are engaging in mutually beneficial interaction with their peers.
What concepts were unclear to you? How will you improve your understanding in these areas?	These questions help the students think through whether there were portions of the material that they did not understand.	Puts onus on students to improve learning strategy or reinforces their mastery of the material.
How is what you are learning about leadership in this activity (course or program) that is different from what you have experienced in your career?	This question helps the students use contrasting to bring in experiences from their lives.	In many instances, they will find that the experiences are similar to their own. Otherwise, they have a rich source of material from which to engage their classmates.
Ultimately, who is responsible for your learning (you, your instructor, your university, others)?	This question reminds the student that he is responsible for ensuring that he is getting the most out of the program.	Engages an internal locus of control and helps prevent them from placing blame on the instructor or the institution.
Ultimately, who suffers if you do not focus on what is important to your learning, your life, and your experience?	The question helps the student keep their priorities at the forefront.	Engages an internal locus of control.
How do your personal characteristics compare with the leadership concepts being studied (both strengths and weaknesses)?	Engages self-discovery awareness .	Leads to heightened self-awareness of how the learner is operating as a leader.

CONCLUSION

In Embry-Riddle Aeronautical University-Worldwide's MSL program, critical thinking is considered a foundational set of competencies, skills, and behaviors for leaders. Critical thinking can be systematically developed and cultivated. The MSL, incorporating many ideas from the Paulian view of critical thinking, introduces critical thinking in the first required course and then instills the critical thinking concepts through the entire program. The MSL program provides direct critical thinking instruction throughout the program and uses a critical thinking assessment to assess understanding of basic critical thinking skills. In addition, the MSL takes a structured approach to incorporating desired learning points into the curriculum through frameworks, activities, techniques, and moves aimed to improve student thinking of leadership concepts by engaging them in all of the material.

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