

HUMAN RESOURCES SENIOR LEADERS COURSE 42A

Think Critically and Creatively

LESSON PLAN

Version 1.1

September 2016

U.S. ARMY SOLDIER SUPPORT INSTITUTE
Noncommissioned Officer Academy
Human Resources Senior Leaders Course
TLO 0.0 – Conduct Essential Leadership Training
ELO 0.2 - Think Critically and Creatively

LESSON PLAN

Lesson Author: AG Branch, ITD
Date prepared: January 2015
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1. SCOPE: Critical and Creative Thinking is a 3-hour lesson that introduces students to the content of emerging Army doctrine on critical and creative thinking. The purpose of this lesson is to provide students with an understanding of what critical thinking is and to recognize that their thinking can be improved. All subsequent instruction and experience in SLC represent opportunities to think critically and creatively. This is not instruction in problem solving, but it is applicable to problem solving. The individual mental processes involved in critical thinking correspond to processes involved in group decision making. The concrete experience should make students want to know more about how their minds work and why they seem prone to certain errors. That desire to learn about thinking is fulfilled during discussion of the key concepts in emerging Army doctrine on critical and creative thinking. Students are introduced to tools that they can use to enhance the quality of their thought. Those tools should be used throughout the remainder of the SLC.

Students will reach the following lesson outcomes through assigned readings, actively participating in class, and completing the practical exercise:

- Understand how critical and creative thinking enables good decisions
- Understand how critical thinking produces mental agility, resourcefulness and imagination in leaders equipped to act creatively and decisively in all situations

2. LEARNING OBJECTIVE:

Action: Explain the Nature of Critical Thinking and its Relationship to Mission Command

Condition: Senior HR Leaders in a classroom environment working individually and as a member of a small group, using doctrinal and administrative publications, practical exercises, case studies, personal experience, handouts, and discussion.

Standard: Explanation includes—

- 1. Definition and description of critical and creative thinking**
- 2. Components of cognition**
- 3. Examination of the intellectual standards.**
- 4. Sources of creativity and its relationship to innovation.**
- 5. Pitfalls in thinking.**

Learning Domain: Cognitive
Level of Learning: Comprehension

3. STUDENT PREREQUISITE WORK:

a. Prior to Class:

Read:

(1) [*The Miniature Guide to Critical Thinking Concepts and Tools*](#), by Dr. Richard Paul and Dr. Linda Elder (19 Pages)

(2) [TC 2-33.4](#), Intelligence Analysis, Chapter 2 (Analytical Processes, Methodologies, and Terms), pages 1-10 (10 pages)

Resources for additional study:

(1) Psychology of Intelligence Analysis by Richards Heuer. Download at <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/PsychofIntelNew.pdf>

(2) <http://www.criticalthinking.org/>

(3) <http://www.au.af.mil/au/awc/awcgate/awc-thkq.htm>

b. Bring to class: NA

c. Be prepared to answer or discuss the following:

(1) Definition of critical thinking

(2) Universal intellectual standards

4. INSTRUCTOR ADDITIONAL READING(S)/MATERIAL: NA

5. TRAINING AIDS, REFERENCES, AND RESOURCES: This lesson is intended to be facilitated in a small group classroom setting with the ability to project PowerPoint slides and multimedia. Additional resources are available digitally for students to reference on their laptops without having the need to print.

Appendix A: Assessment Plan

Appendix B: Slides

6. CONDUCT OF LESSONS:

a. Lesson Timeline:

5 minutes	"Shift Happens" Video
10 minutes	Concrete Experience: "If p, then q"
10 minutes	Publish and Process
45 minutes	Generalize New Information
10 minutes	Break
40 minutes	Generalize New Information
10 minutes	Develop
10 minutes	Break
30 minutes	Apply

NOTE: *Adjust the Lesson Timeline as necessary to facilitate class schedule, your teaching style, and student learning. **You are not bound by any time constraints during any phase of the ELM model.***

NOTE: *Your purpose in this block is first to make your students believe that they will be more effective leaders if they improve the quality of their thinking and to overcome any resistance to the idea by applying new knowledge in a short exercise. Lesson design supports achievement of that purpose by first demonstrating how error-prone in our thinking we are and then demonstrating that there is a body of well-researched and practical knowledge – documented in emerging Army doctrine – which they can use and benefit from immediately.*

Conduct this lesson as early in the course as possible after the "ice" has been broken. Reinforce the content throughout the course by being a model of critical and creative thinking yourself; providing your students opportunities to think critically and creatively using these tools; and by providing them frequent informal and formal feedback focused on critical thinking skills. The lesson design and materials should not be a constraint to you. The only constraint upon the instructor is the learning objective.

a. Discussion begins.

Slide 1: Shift Happens	
<p><i>Show video (4:22)</i></p> <p>http://www.youtube.com/watch?v=XVQ1ULfQawk</p>	 <p>Shift Happens</p> <p>DID YOU KNOW</p> <p>?</p>

Slide 2: Title Slide	
<p><i>Lesson Introduction</i></p>	 <p>SSI Noncommissioned Officer Academy Senior Leaders Course</p> <p>Think Critically and Creatively</p>

b. Concrete Experience (10 min): “If p then q”. When students are settled, display the first slide, and let them read it.

Slide 3: Rules of Engagement	
<p>Rules of Engagement for Concrete Experience</p> <p><i>Do not provide a lot of set-up for this exercise. Emphasize that they are not “trick” questions, and this is not an intelligence test. You don’t even want to know what answers they give. Make sure everyone is prepared to write down their answers on something.</i></p>	<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <p>Rules of Engagement Think Critically and Creatively</p> </div>  </div> <ul style="list-style-type: none"> • You will be asked to answer two questions that call for reasoning. • These are not “trick” questions. • The information provided on the slides is true and complete – take it at face value. • This is not a test of intelligence. • You will have 60 seconds for each question. • Jot down your answers on a piece of paper. • These are not “trick” questions. <p style="text-align: right; font-size: small;">3</p>

Slide 4: Card Problem	
<p>Card Problem</p> <p><i>Check time and give them 60 seconds. If there are questions, answer them if possible by restating something from the ROE slide. After 60 seconds, next slide.</i></p>	<div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <p>Concrete Experience Think Critically and Creatively</p> </div>  </div> <p>Pictured below are four cards. Each card has a letter on one side and a number on the other.</p> <p>Rule: If the letter is a vowel, the number must be even.</p> <div style="display: flex; justify-content: center; gap: 10px; margin: 10px 0;"> <div style="background-color: #4a86e8; color: white; padding: 10px; font-size: 24px; text-align: center;">A</div> <div style="background-color: #c0c090; padding: 10px; font-size: 24px; text-align: center;">B</div> <div style="background-color: #e08080; padding: 10px; font-size: 24px; text-align: center;">4</div> <div style="background-color: #70ad47; color: white; padding: 10px; font-size: 24px; text-align: center;">7</div> </div> <p style="text-align: center;">Which card(s) must you check <i>at the minimum</i> to ensure compliance with the rule?</p> <p style="text-align: right; font-size: small;">4</p>

Slide 5: Drinking Age Problem

Same drill. Emphasize again, that the age and drink labels are to be treated as known facts. 60 Seconds. "Stop". Hit the "B" button on the keyboard so the screen goes black. Ask an open-ended question to get students talking with one another – "how do you think you did?" Don't ask for their answers, but if necessary ask if they found the questions hard or easy. Probably some students will start sharing answers with each other – that's good. After some students have staked-out a position and others have realized they might be wrong...Next slide.



Concrete Experience

Rule: You must be at least 21 to drink alcoholic beverages

She's 23

He's drinking lemonade

He's drinking wine

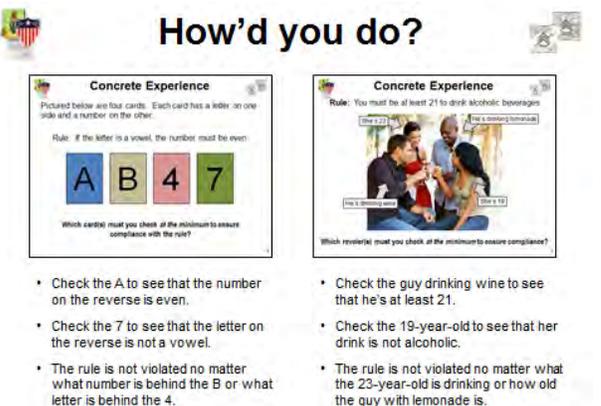
She's 19

Which reveler(s) must you check at the minimum to ensure compliance?

Slide 6: How'd you do?

Give them a minute to read the solutions. Check their reactions. Let the conversations continue.

Leave the slide up as you begin the Publish and Process phase.



How'd you do?

Concrete Experience

Pictured below are four cards. Each card has a letter on one side and a number on the other.

Rule: If the letter is a vowel, the number must be even.

A B 4 7

Which reveler(s) must you check at the minimum to ensure compliance with the rule?

Concrete Experience

Rule: You must be at least 21 to drink alcoholic beverages

She's 23

He's drinking lemonade

He's drinking wine

She's 19

Which reveler(s) must you check at the minimum to ensure compliance?

- Check the A to see that the number on the reverse is even.
- Check the 7 to see that the letter on the reverse is not a vowel.
- The rule is not violated no matter what number is behind the B or what letter is behind the 4.
- Check the guy drinking wine to see that he's at least 21.
- Check the 19-year-old to see that her drink is not alcoholic.
- The rule is not violated no matter what the 23-year-old is drinking or how old the guy with lemonade is.

c. Publish and Process (10 min): This phase is student-centered and instructor facilitated.

The "publish" portion is a short discussion on how group members felt during their experience of generating data. This phase focuses on the group dynamics during the exercise and is **NOT** intended to be a discussion of the content generated. This can be kept short; once the group moves to "process," they will likely continue to add to "publishing" type information. **Do not let the group jump straight to content.** When well facilitated, publishing is a good method to relate a discussion of interpersonal communication and group dynamics to the broader topic of leader competencies described in FM 6-22, Army Leadership.

Instructor Questions:

- *What happened? How did you feel about that?*
- *Who had a similar or different experience, and why? Were there any surprises?*
- *What did you learn from the group experience?*

Questions the instructor may ask to assist in publishing: (Intent is to push critical thinking. Push students to defend their answers – allow students to hash out ideas).

As the discussion develops, steer to the following points:

- The two questions are logically identical, but for most of us, the card question is harder than the drinking age question.
- The first situation is abstract and not familiar to us so we must engage in deliberate analytic thinking. We go step-by-step, trying to "what if" each card.
- Thinking analytically, we might make inferences not implied by the rule, like, "if the number's even, it must have a vowel on the reverse", or "if the letter's not a vowel, it must not have an even number". Someone who did this probably checked more cards than necessary – maybe all of them.
- The second situation is more natural and familiar to most of us, so we don't need to engage deliberate reasoning in the same way. It's obvious that a 23-year old can't be in violation of the under-age drinking rule. But it's not obvious that a card with the number 4 can't be in violation of the vowels-must-have-even-numbers rule even though it's the exact same thing logically.
- In the natural situation, we're less prone to make the same errors we might in the abstract situation. Few of us would reason, for instance that "that woman is over 21, so she's required to drink alcohol" or "that guy is not drinking alcohol, so he's required to be under 21". But if you thought consonants were required to have odd numbers, you were making the same logical error.
- Two common responses to the card question are: Check the "A" and the "4"; check only the "A". When we rely on our analytic reasoning ability, many of us tend to look for instances that confirm expectations, but neglect to look for disconfirming instances. We're less likely to make that mistake in a familiar setting where we reason more naturally.

- After struggling with the card question, the drinking age situation might prove difficult because of "over-think". This is a tendency to believe that thinking harder will lead to a better answer. If the drinking age situation is posed first, people are more likely to get it right because they are less likely to over-analyze it. This over-analyze tendency is the same thing that can lead a skilled athlete to "choke" under stress.
- ***If we understood a little better how our brains work, we could make better decisions.***

The test does not imply anything about how good of a thinker you are. The idea was to get you to **start thinking about your own thought processes**. Our thought processes are the topic for the next few hours. As you know from the advance sheet, the objective of this instruction and the rest of SLC are to help you to improve your own thinking by making it more critical and more creative. The Army has been talking about critical and creative thinking for a long time.

d. Generalize New Information (45 minutes):

Slide 7: Learning Objective	
<p><i>This lesson is focused on meeting leadership education outcomes.</i></p>	<div style="display: flex; justify-content: space-between; align-items: center;">  <h3 style="margin: 0;">Learning Objective</h3>  </div> <p>ACTION: Explain the nature of critical thinking and its relationship to effective leadership</p> <p>CONDITIONS: Senior HR Leaders in a classroom environment working individually and as a member of a small group, using doctrinal and administrative publications, practical exercises, case studies, personal experience, handouts, and discussion.</p> <p>STANDARD: Explanation includes:</p> <ol style="list-style-type: none"> 1. Definition and description of critical and creative thinking 2. Explanation of the components of cognition 3. Examination of the intellectual standards. 4. Explain sources of creativity and its relationship to innovation. 5. Explanation of the pitfalls in thinking. <p style="text-align: right; font-size: small;">7</p>

NOTE: The purpose of this lesson is not to impart knowledge and move on – it is intended to get students thinking about how important effective leadership is. There are very few slides in the lesson; however, there are multiple opportunities for discussion. While topic slides do introduce knowledge and provide a focus, they are primarily designed to start discussions and constantly engage students, even in the GNI portion. The information covered in this lesson is basic and even students with limited leadership time, knowledge, and skills. The products of critical and creative thinking at the individual level are the ideas each leader forms about what to believe or do. Every choice – large or small – is guided by thinking which is critical and creative in varying degrees. As such, critical thinking is an inherent part of everything else we ask of Army leaders throughout the rest of their careers.

Slide 8: Comic Relief

Ice-breaker (optional). Humorous video of comic [Mark Gungor](#). (2:40). Comic relief if needed.

- *Men's brains are made of little boxes.*
- *Women's brains are like wires.*

<http://www.youtube.com/watch?v=ZoqpjOZxf2M>



Comic Relief



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Slide 9: Think Critically and Creatively - Outline

*This lesson covers a lot of information in a very short period of time. This is only an introduction to each of these topics on the slide with only nine (9) slides of Generalize New Information (GNI). I will give you the slides with speaker notes when we're done, so don't **"take"** notes. Instead, please participate and ***make*** notes on your thoughts. Please ask questions as we go along.*



Think Critically and Creatively



Outline

- Critical Thinking: What and why
- Components of cognition
- Intellectual Standards
- Disciplined thinking
- Pitfalls in thinking
- Creativity and innovation
- Tools for creativity
- Intuition
- Summary
- Practical Exercise

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Slide 10: Critical Thinking: What and Why

Cognition is “knowing”. We **MAKE** sense – the knowledge we accept as true. Knowledge guides our actions. Modern warfare is complex.

Technology doesn't think for us, no matter what the vendors say. Mission Command requires that all leaders exercise greater judgment.

We apply our judgment to making decisions **analytically, intuitively, or by a combination.**



Critical Thinking: What and Why



- Use of cognitive skills
- We develop knowledge (*make* sense)
- ULO, complexity requires judgment, innovation & mental agility
- Is your phone really smart?
- Mission Command: We're all decision makers
- Decision making
 - Analytic
 - Intuitive

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Slide 11: Intellectual Standards

NOTE: Refer students to TC 2-33.4, Chapter 2, pages 1-10

Universal intellectual standards are standards which must be applied to thinking whenever one is interested in checking the quality of reasoning about a problem, issue, or situation.



Intellectual Standards



- Clarity
- Accuracy
- Precision
- Relevance
- Depth
- Breadth
- Logic
- Fairness



Universal intellectual standards are standards which must be applied to thinking whenever one is interested in checking the quality of reasoning about a problem, issue, or situation. To think critically entails having command of these standards. To help invoke critical thinking, it is best to pose questions which probe others' thinking; questions which hold individuals accountable for their thinking; questions which, through consistent use, become internalized by individuals as questions they need to ask themselves.

The ultimate goal, then, is for these questions to become infused in the thinking, forming part of your inner voice, which then guides you to better and better reasoning. While there are many universal standards, the following are some of the most essential:

CLARITY: *Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration? Could you give me an example?* Clarity is the gateway standard. If a statement is unclear, we cannot determine whether it is accurate or relevant. In fact, we cannot tell anything about it because we don't yet know what it is saying. For example, the question, "What can be done about the education system in America?" is unclear. In order to address the question adequately, we would need to have a clearer understanding of what the person asking the question is considering the "problem" to be. A clearer question might be "What can educators do to ensure that students learn the skills and abilities which help them function successfully on the job and in their daily decision-making?"

ACCURACY: *Is that really true? How could we check that? How could we find out if that is true?* A statement can be clear but not accurate, as in "Most dogs are over 300 pounds in weight."

PRECISION: *Could you give more details? Could you be more specific?* A statement can be both clear and accurate, but not precise, as in "Jack is overweight." (We don't know how overweight Jack is, one pound or 500 pounds.)

RELEVANCE: *How is that connected to the question? How does that bear on the issue?* A statement can be clear, accurate, and precise, but not relevant to the question at issue. For example, students often think that the amount of effort they put into a course should be used in raising their grade in a course. Often, however, the "effort" does not measure the quality of student learning; and when this is so, effort is irrelevant to their appropriate grade.

DEPTH: *How does your answer address the complexities in the question? How are you taking into account the problems in the question? Is that dealing with the most significant factors?* A statement can be clear, accurate, precise, and relevant, but superficial (that is, lack depth). For example, the statement, "Just say No!" which is often used to discourage children and teens from using drugs, is clear, accurate, precise, and relevant. Nevertheless, it lacks depth because it treats an extremely complex issue, the pervasive problem of drug use among young people, superficially. It fails to deal with the complexities of the issue.

BREADTH: *Do we need to consider another point of view? Is there another way to look at this question? What would this look like from a conservative standpoint? What would this look like from the point of view of . . . ?* A line of reasoning may be clear accurate, precise, relevant, and deep, but lack breadth (as in an argument from either the conservative or liberal standpoint which gets deeply into an issue, but only recognizes the insights of one side of the question.)

LOGIC: *Does this really make sense? Does that follow from what you said? How does that follow? But before you implied this, and now you are saying that; how can both be true?* When we think, we bring a variety of thoughts together into some order. When the combinations of thoughts are mutually supporting and make sense in combination, the thinking is "logical." When the combination is not mutually supporting, is contradictory in some sense or does not "make sense," the combination is not logical.

FAIRNESS: *Do I have a vested interest in this issue? Am I sympathetically representing the viewpoints of others?* Human think is often biased in the direction of the thinker - in what are the perceived interests of the thinker. Humans do not naturally consider the rights and needs of others on the same plane with their own rights and needs. We therefore must actively work to make sure we are applying the intellectual standard of fairness to our thinking. Since we naturally see ourselves as fair even when we are unfair, this can be very difficult. A commitment to fair-mindedness is a starting place.

Slide 12: Components of Cognition

*There are two systems by which we come to know things. The **deliberate** system is the one we are aware of and control. The **tacit** system is automatic. We may not be aware of it. We recognize **five components** of cognition. Improvement in any component produces better thinking. We **perceive** with any of our senses. **Concepts** are our mental vocabulary. When we **relate concepts**, we form complete ideas. **Reasoning** combines ideas (premises) to lead us to new ideas (conclusions). **Recall** is the ability to access our memory.*



Components of Cognition



- Deliberate and Tacit systems
 - Perception
 - Forming Concepts
 - Relating Concepts
 - Reasoning
 - Recall



Slide 13: Disciplined thinking

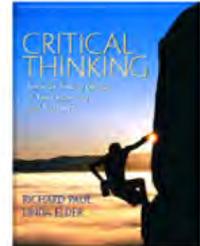
Refer to the **Miniature Guide to Critical Thinking Tools and Techniques**. Paul and Elder are two of the leading researchers in the field. The elements are a tool to ensure your thinking is complete. The standards ensure rigor. When we think about our own thinking to apply discipline, we are using **metacognition**. A team-based approach is where two or more people work together to discipline each other's thinking through questioning and coaching.



Disciplined Thinking



- Richard Paul and Linda Elder
 - The Elements of Thought
 - The Standards of Thinking
- Approaches
 - Metacognitive
 - Team-based



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Slide 14: Pitfalls in Thinking (1 of 2)

“Heuristic” = by trial and error.
Heuristic learning leads to 3 types of bias.

- **Availability:** what comes to mind first.
- **Representative:** our own experience dominates even if it's not representative.
- **Anchoring:** stuck on what's worked before.

Logical Fallacies

- **Attacking the person:** If we disagree “you're an idiot”.
- **False dichotomy:** few things are really black and white.
- **False cause:** just because A was followed by B that doesn't mean A **caused** B
- **Appeal to the masses:** “Everybody knows...”, but “everybody” is often wrong.

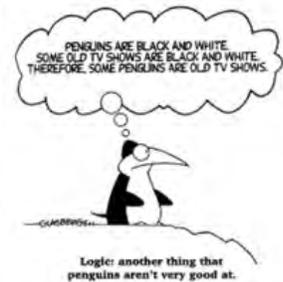


Pitfalls in Thinking

(1 of 2)



- Heuristic-related bias
 - Availability
 - Representative
 - Anchoring
- Logical Fallacies
 - Attacking the person rather than the idea
 - False dichotomy
 - False cause
 - Appeal to the masses



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Slide 15: Pitfalls in Thinking (2 of 2)

Confirmation bias: We see what we expect to see; what aligns with what we already believe

Sunk cost: Reluctance to let go of an idea we've invested in, e.g., "...that these dead shall not have died in vain..."

Cultural bias: Hard to see ourselves objectively. Are "they" habitually late, or are "we" time-obsessed?

Gambler's fallacy: Random events have memory – "our luck is bound to change"

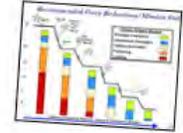
Overthink: I just need to focus, concentrate, try harder



Pitfalls in Thinking

(2 of 2)

- Other biases & traps
 - Confirmation bias
 - Sunk cost bias
 - Cultural bias
 - Gambler's fallacy
 - Overthink
 - Others?



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BREAK. Providing the training schedule provides and available time permits, you may want to provide the students a short break before transitioning to Changing Educational Paradigms and additional GNI.

Generalize New Information (40 minutes):

Slide 16: Changing Educational Paradigms

On return from break watch this 11-minute video. Minimal set-up. Just say "As you watch this I want you to make sense of it. In other words, what does it mean to you. Make notes if you wish – may be useful later in an exercise.

NOTE: Slide has embedded hyper-link]
http://www.youtube.com/watch?v=zDZFcDGpL4U&feature=player_embedded



What does this mean to YOU?
In other words, MAKE sense of it.
Make (don't "take") notes if you wish.

Slide 17: Creativity and Innovation

It's possible to think critically without being creative. It's not possible to be creative without thinking critically.

The goal is innovation – something practical -- not art for its own sake. The essence of creativity is seeing connections between seemingly un-connected things. These non-obvious connections are usually analogical.

Leaders set an example and create climates conducive to creativity



Creativity and Innovation

(Original Ideas)

(Value)



- Creativity: an outgrowth of critical thinking
- Logical vs. Ana-logical
 - Everything is connected
 - Relevance is relative
- Leader's role
 - Example
 - Climate
- Innovation: creativity made practical



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Slide 18: Tools for Creativity & Innovation

Brainstorm: Unconstrained, non-judgmental idea generation. Prevent groupthink.

Out-side in Thinking: Graphically depict the subject area **in** a box and generate influencers outside of the box.

Red-Team: Appoint role players to represent adversary/opponent.

What-if: Suppose an event you've assumed away happens.

Post-mortem: Assume a COA under consideration fails and explain how.



Tools for Creativity & Innovation



- Brainstorm
- Outside-In Thinking
- Red-Teaming
- What-if?
- Post-mortem analysis
- Others?



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Slide 19: Intuition

Tacit learning produces intuition. We perceive and record things unconsciously. We identify patterns and store them in memory. Mental simulations anticipate sequels. Our response is emotional, visceral.

“Insight” is a conclusion from the tacit system that we become aware of but often cannot explain. The patterns are only valid if based on a large store of similar situations. For true experts, intuition is reliable within their field.



- Insight generated by the tacit system
- Experience-based
- Pattern recognition & mental simulation
- Very situation-specific
- Guidelines:
 - Not trustworthy in unfamiliar situations
 - Reliable in genuine experts
 - Use analytics to check, time permitting

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NOTE: Time to revisit the information.

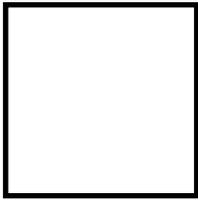
1. This activity is called a “**Geometric Close**”. Using the dry erase board or butcher-block paper draw the follow shapes on the flip chart.

- A Square
- A Triangle
- A Circle
- A “Z”

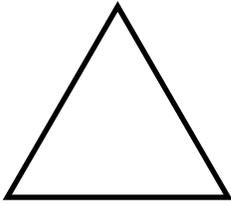
2. Each participant is asked to do the following.

1. Find something in the training that “squared” with what they already thought and share it with others. **(SQUARE)**
2. Find something in the training that made them view something from a new angle and share it. **(TRIANGLE)**
3. Find some new piece of information that completed or “closed the circle” for them and share it. **(CIRCLE)**
4. List an action or a new approach they will now take and share it **(“Z”)**.

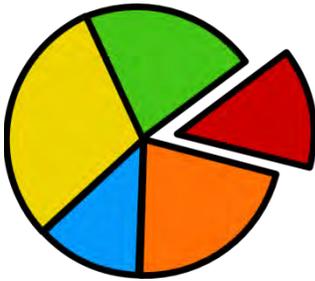
SAMPLE CHART



What squared (agreed) with something you already knew?



What did you see from a new angle?



What did you learn that was new, that completed a circle of knowledge?



What new direction will you go in? What action will you take?

Slide 20: Summary

Like drinking from a fire hose – Covered a lot of material.

I will be looking for you to use these concepts and techniques throughout the course.



Summary



- Critical Thinking: Develop knowledge that conforms to reality ... to make [better] choices...
- Components of cognition: Tacit & deliberate systems
- Disciplined thinking: Elements and Standards
- Creativity and innovation: Original ideas with value
- Tools for creativity & innovation: 5+ ...
- Pitfalls in thinking: Heuristic-related; logical fallacies; other biases.
- Intuition: Not magic; province of experts

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e. Develop (10 min): This phase is student-centered and instructor facilitated.

NOTE: *Instructors now initiate a student discussion of how material in the lesson plan will be used in their future assignments. Although instructors can guide students in the discussion, the answers ultimately belong to the students. Instructors should leverage their own experiences and ask pertinent questions pertaining to the information presented. Potential questions may include:*

- *Does Critical/Creative thinking work in the operational environment? Is it encouraged? Provide examples.*
- *Has this lesson helped them see linkage between Critical/Creative Thinking and Leadership?*
- *Could you teach/train your subordinates/junior leaders on Critical and Creative Thinking? At what level/grade should Soldiers be introduced to these subjects?*
- *Did this lesson increase your awareness of your own abilities to apply critical and creative thinking? How? Provide examples.*

f. Assessment Plan: See Appendix A.

BREAK. *Providing the training schedule provides and available time permits this is a good point to provide the students a short break before transitioning to the Apply Phase.*

g. Apply (30 mins): Administer Practical Exercises. The Critical and Creative Thinking lesson consists of two short Practical Exercises.

Slide 21: Think Critically and Creatively – Practical Exercise #1

Administer PE#1.

NOTE: These Practical Exercises and the Answer Key are also available as a separate Word Document in the SLC Courseware Library.



Think Critically and Creatively PRACTICAL EXERCISE #1

GROUP 1 – CATCH THAT BICYCLE!

Two (2) boys on bicycles, 20 miles apart, began racing toward each other. The instant they started, a fly on the handle bar of one of the bikes started flying toward the other bike's handle bar. As soon as it reached, it turned around and went to the other bike and so on until the bikes met. If each bike had a constant speed of 10 mph, and the fly was traveling 15 mph constantly, how far did the fly travel?



GROUP 2 – THE HOURS UP!

You have two hourglasses—a 4-minute glass and a 7-minute glass. You want to measure 9 minutes. How do you do it?



GROUP 3 – HOW OLD ARE YOU NOW?

Eight years ago, Mary was half as old as Jane will be when Jane is one year older than Tim will be at the time when Mary will be five times as old as Tim will be two years from now. Ten years from now Tim will be twice as old as Jane was when Mary was nine times as old as Tim. When Tim was one year old, Mary was three years older than Tim will be when Jane is three times as old as Mary was six years before the time when Jane was half as old as Tim will be when Mary will be ten years older than Mary was when Jane was one-third as old as Tim will be when Mary will be three times as old as she was when Jane was born. How Old Are They Now?



GROUP 4 – THE BOOKWORM

A bookworm eats from the first page of an encyclopedia to the last page. The bookworm eats in a straight line. The encyclopedia consists of ten 1000-page volumes and is sitting on a bookshelf in the usual order. Not counting covers, title pages, etc., how many pages does the bookworm eat through?



GROUP 5 – THE FARMER

A farmer buys a horse for \$60. He sells it to his neighbor for \$70. Then he discovers he could have made a better deal. He borrows \$10 from his wife and buys the horse back for \$80. He then sells it to another neighbor for \$90. How much money did he make?



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Practical Exercise 1: Divide the class into four groups. Assign each group one of the following puzzles. Each group should have a different puzzle. Allow **10 minutes** to complete their assigned puzzle and prepare a back brief to the class explaining their solution.

GROUP 1: Catch the Bicycle. Two (2) boys on bicycles, 20 miles apart, began racing toward each other. The instant they started, a fly on the handle bar of one of the bikes started flying toward the other bike's handle bar. As soon as it reached, it turned around and went to the other bike and so on until the bikes met. If each bike had a constant speed of 10 mph, and the fly was traveling 15 mph constantly, how far did the fly travel?

SOLUTION: Each bike travels at 10 mph, so they meet at the center of the 20-mile distance in exactly 1 hour. The fly travels 15 mph and so at the end of the hour, he will have gone 15 miles.

GROUP 2: How Old Are You Now?

Eight years ago, Mary was half as old as Jane will be when Jane is one year older than Tim will be at the time when Mary will be five times as old as Tim will be two years from now. Ten years from now Tim will be twice as old as Jane was when Mary was nine times as old as Tim. When Tim was one year old, Mary was three years older than Tim will be when Jane is three times as old as Mary was six years before the time when Jane was half as old as Tim will be when Mary will be ten years older than Mary was when Jane was one-third as old as Tim will be when Mary will be three times as old as she was when Jane was born. How Old Are They Now?

SOLUTION. Tim is 3, Jane is 8, and Mary is 15. Clue number 1 leads to the situation a year and a half ago, when Tim was 1 1/2, Jane was 6 1/2, and Mary was 13 1/2.

GROUP 3: The Bookworm

A bookworm eats from the first page of an encyclopedia to the last page. The bookworm eats in a straight line. The encyclopedia consists of ten 1000-page volumes and is sitting on a bookshelf in the usual order. Not counting covers, title pages, etc., how many pages does the bookworm eat through?

SOLUTION: On a book shelf the first page of the first volume is on the "inside" so the bookworm eats only through the cover of the first volume, then 8 times 1000 pages of Volumes 2 - 9, then through the cover to the 1st page of Vol 10. He eats 8,000 pages. If the bookworm ate the first page and the last page, it ate 8,004 pages.

GROUP 4: The Farmer

A farmer buys a horse for \$60. He sells it to his neighbor for \$70. Then he discovers he could have made a better deal. He borrows \$10 from his wife, and buys the horse back for \$80. He then sells it to another neighbor for \$90. How much money did he make?

SOLUTION: The farmer ended up with \$90. The total he had was: \$60 + \$10 from his wife == \$70. $\$90 - \$70 = \$20$ dollars profit.

GROUP 5. The Hours Up! You have two hourglasses--a 4-minute glass and a 7-minute glass. You want to measure 9 minutes. How do you do it?

SOLUTION. Start both hourglasses. When the 4-minute glass runs out, turn it over (4 minutes elapsed). When the 7-minute glass runs out, turn it over (7 minutes elapsed). When the 4-minute glass runs out this time (8 minutes elapsed), the 7-minute glass has been running for 1 minute. Turn it over once again. When it stops, 9 minutes have elapsed.

Slide 22: Think Critically and Creatively – Practical Exercise #2

Administer PE#2.



Think Critically and Creatively PRACTICAL EXERCISE #2



Tour Guide for an Alien

Imagine that you have been assigned the task of conducting a tour for aliens who are visiting earth and observing human life. You're riding along in a blimp, and you float over a professional baseball stadium. One of your aliens looks down and becomes very confused, so you tell him that there is a game going on.

Try to answer the following questions for him.



1. What is a game?
2. Why are there no female players?
3. Why do people get so passionate watching other people play games?
4. What is a team?
5. Why can't the people in the seats just go down on the field and join in?

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Practical Exercise 2: Divide the class into two groups and have them complete the following exercise. After **20 (+/-)** minutes have the groups brief their findings to the class.

Tour Guide for an Alien

Imagine that you have been assigned the task of conducting a tour for aliens who are visiting earth and observing human life. You're riding along in a blimp, and you float over a professional baseball stadium. One of your aliens looks down and becomes very confused, so you tell him that there is a game going on.

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1. What is a game?
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4. What is a team?
5. Why can't the people in the seats just go down on the field and join in?

If you try to answer these questions fully, it will quickly become apparent that we carry around certain assumptions and values. We support a certain team, for instance, because it makes us feel like we're a part of a community. This sense of community is a value that matters to some people more than others.

Furthermore, when trying to explain team sports to an alien, you have to explain the value we put on winning and losing.

When you think like an alien tour guide, you are forced to take a deeper look at the things we do and things we value. They don't always sound so logical and true from the outside looking in!

**Appendix A
Assessment Plan**

TLO 0.0 – Conduct Essential Leadership Training

Module Assessment				
Contribution to Group Work	Written Communication	Oral Communication	Module Post-Assessment	TOTAL
75%	NA	25%	NA	100%

- ELO 0.1 Army Writing Program (*graded separately*)
- ELO 0.2 Think Critically and Creatively**
- ELO 0.3 Resilience Training for Mid-Grade Leaders
- ELO 0.4 Operational Security (OPSEC)
- ELO 0.5 Cultural Awareness
- ELO 0.6 Suicide Awareness for Soldiers
- ELO 0.7 Sexual Harassment / Assault Response & Prevention (SHARP)
- ELO 0.8 Equal Opportunity Program Level V
- ELO 0.9 Examine the Role of the First Sergeant
- ELO 0.10 Develop Subordinate Leaders
- ELO 0.11 Implement Army Weight Control Program
- ELO 0.12 Assess Unit and Individual Fitness
- ELO 0.13 Examine the Situational Leadership Theory

Contribution to Group Work. See SLC Contribution to Group Work Rubric for specific grading criteria.

Written Communication. The Army Writing Program is graded separately. Information on writing requirements will be provided by your instructor.

Oral Communication. See SLC Oral Communication Rubric for specific grading criteria.

Module Post-Assessment. NA

Appendix B

List of Slides

- Slide 1: Shift Happens
- Slide 2: Title Slide – Critical and Creative Thinking
- Slide 3: Rules of Engagement
- Slide 4: 4 Cards
- Slide 5: Alcoholic Beverages
- Slide 6: How'd You Do?
- Slide 7: Learning Objective
- Slide 8: Comic Relief
- Slide 9: Outline
- Slide 10: Critical Thinking: What and Why
- Slide 11: Intellectual Standards
- Slide 12: Components of Cognition
- Slide 13: Disciplined Thinking
- Slide 14: Pitfall in Thinking (1 of 2)
- Slide 15: Pitfall in Thinking (2 of 2)
- Slide 16: Changing Educational Paradigms - Video
- Slide 17: Creativity and Innovation
- Slide 18: Tools for Creativity & Innovation
- Slide 19: Intuition
- Slide 20: Summary
- Slide 21: Practical Exercise #1
- Slide 22: Practical Exercise #2