PARTICIPANT GUIDE

Cubic Integrator Learning Journey

Session 5: Critical Thinking and Creative Problem Solving

CUBIC

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Learning That Powers Performance

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MANAGEMENT AND LEADERSHIP

Cubic Integrator Learning Journey

Session 5: Critical Thinking and Creative Problem Solving

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MDV829e-1121 Session 5

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING
Session Goal
The goal of this session is to increase your ability to drive innovation by building cognitive diversity and fostering both critical and creative thinking within your hybrid team.

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Session Learning Objectives

By the end of this session, you will be able to:

- Articulate the intimate connection between critical thinking and creative thinking
- Recognize the importance of defining the right problem
- Apply various problem-solving approaches to real-life challenges
- Leverage different tools and techniques to generate divergent and convergent thinking
- Employ selected techniques and models to enhance the quality and robustness of your decisions
- Integrate creative and critical thinking to engage in problem-solving challenges

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Session Topics

- ***Foundation Concepts***
- Defining the Problem
- Generating Alternative Solutions
- Evaluating Alternatives
- Types of Problems We Encounter

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Kickoff Question

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ANNOTATE

Virtual Spectrogram

What kind of thinking does your team engage in most at work?

Mostly creative	More creative than critical	More critical than creative	Mostly critical

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Definition of Critical Thinking

"Defining Critical Thinking." criticalthinking.org, The Foundation for Critical Thinking, 2017, www.criticalthinking.org/pages/defining-critical-thinking/766.

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According to the Foundation for Critical Thinking, critical thinking is a kind of thinking that involves self-improvement through the use of objective standards.

In other words, it is: "self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities and a commitment to overcome our native egocentrism and socio-centrism."

Source: http://www.criticalthinking.org/pages/defining-critical-thinking/410

Benjamin Bloom was an American educational psychologist who made important contributions to the classification of educational objectives and the theory of mastery learning. His life's work revolved around understanding and defining the nature of thinking.

In 1956, he **published the *Taxonomy of Educational Objectives*** with collaborators Max Englehart, Edward Furst, Walter Hill, and David Krathwohl. The taxonomy is **a framework for categorizing educational goals, and it classifies thinking according to six cognitive levels of complexity.** The framework was revised in 2001, making it more relevant for twenty-first century education. The levels are:

- **Remembering:** being able to recall facts and basic concepts
- **Understanding:** being able to explain ideas or concepts
- **Applying:** being able to use information in new situations
- **Analyzing:** being able to draw connections among ideas
- **Evaluating:** being able to justify a stand or decision
- **Creating:** being able to produce new or original work

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Defining "Creative"

creative

1) Creating or able to create
2) Having or showing imagination and **artistic or intellectual** inventiveness
3) Stimulating the imagination and inventive powers

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Classic Thinking Styles

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Adapted from: Herrmann, N. (2015). The Whole Brain Business Book, McGraw Hill: NY. Also adapted from the Everything DiSC® framework, John Wiley & Company..

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INDIVIDUAL ACTIVITY

Thinking Styles on Your Team

Individually:

- Open the **Session 5 handout** PDF.
- On **page 1**, type the names of your team members (and extended team, if you like) into the appropriate quadrant in the thinking styles model.
- Reflect on whether your team is more homogeneous in its thinking styles or more diverse.

Save your work, as we will return to the thinking styles model in a later activity.

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Handout 1

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Session Topics

- Foundation Concepts
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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Basic Framework for Problem Solving

A variation on four steps:

1) Defining the problem
2) Generating alternative solutions
3) Evaluating and selecting an alternative
4) Implementing solutions

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Einstein on Problem Solving

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CLASS DISCUSSION

Solving the Wrong Problem

Reflect on a time where either you or your team realized in hindsight that the problem you were focused on solving was not actually the right problem.

As a class:

- Let's discuss your scenario(s).
- Why do you think your focus was off?
- Was the "problem" actually a symptom?

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Problem Definition

Problem definition consists of defining the real business problem as opposed to:

- Symptoms
- Solutions
- Situations
- Requirements

There are a variety of tools and techniques we can use to investigate the root cause to determine what the **real** problem is.

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VIDEO

The 5 Whys

Handout 2

https://www.youtube.com/watch?v=BEQvq99PZwo

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https://www.youtube.com/watch?v=BEQvq99PZwo

To properly solve a problem – and sometimes to properly define it – you need to drill down to get through the symptoms of the problem so you can address the root cause.

The 5-Whys Technique was devised by Sakichi Toyoda (the founder of Toyota Industries) in the 1930s. The technique itself is very simple: when a problem occurs, you investigate its nature and causes by asking “why?” at least five times. It is important to have the right people provide the answers to your questions, in order to arrive at a conclusion that is accurate.

5 Whys is great for problems that are not very complex, but for problems where there may be multiple causes, a more formal cause and effect analysis would be a better choice.

A fishbone diagram – or Ishikawa diagram – is an example of a more complex (than the 5 Whys) cause-and-effect tool. Dr. Kaoru Ishikawa, a Japanese quality control expert, is credited with inventing the fishbone diagram to help employees avoid solutions that merely address the symptoms of a much larger problem.

To create an Ishikawa diagram:

- Draw a circle on the right to create the “head,” which lists the problem or issue to be studied.
- Create a backbone for the fish (straight line which leads to the head).
- Identify at least four “causes” that contribute to the problem. Connect these four causes with arrows to the spine. These will create the first bones of the fish.
- Then brainstorm around each “cause” to document those things that contributed to the cause.
- Continue breaking down each cause until the root causes have been identified.

Here’s the link to a short video on creating a fishbone diagram:
https://www.youtube.com/watch?v=11_pvMrWnks

GROUP BREAKOUT ACTIVITY

Root Cause Analysis

Individually:

- Identify a problem in your work or personal life to which you can apply root cause analysis

In your small groups:

- Select one problem to work on as a group
- Apply the root cause analysis technique assigned to you by the instructor to come up with a root cause
- Be prepared to share with the large group

Document your work and be prepared to share with the class.

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Handout 2-4

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Session Topics

- Foundation Concepts
- Defining the Problem
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There are many kinds of obstacles that can interfere with our ability to solve a problem quickly and efficiently.

A “mental set” is a tendency to only use solutions that have worked in the past instead of exploring – or being open to – alternative ideas.

Similarly, functional fixedness refers to the tendency to view problems only in their customary manner. This kind of limited thinking can prevent us from fully seeing all of the different options that might be available to find a solution.

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Functional Fixedness

Functional fixedness

A type of cognitive bias that involves a tendency to see objects as only working in a particular way

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INDIVIDUAL ACTIVITY

Alternative Uses

Take 60 seconds to write down as many different uses as you can for this object:

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Why Is Thinking Outside the Box a Critical Skill Set?

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Divergent and Convergent Thinking

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Separate Idea Generation from Idea Selection

Separate your thinking!

Creative Thinking

- Defer judgment
- Go for quantity
- Make connections
- Seek novelty
- Use the wildcard principle

Critical Thinking

- Apply affirmative judgment
- Keep novelty alive
- Check your objectives
- Stay focused
- Use the wildcard principle

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Brainswarming: A Different Kind of Idea Generation

1) **Define the problem and the resources available for solving it**
   - Write the goal at the top of a whiteboard
   - Write the resources at the bottom
2) **Add ideas as offshoots of these**
   - Working from the top down, connect ideas stemming from the goal (these should start with verbs)
   - Working from the bottom up, list attributes and components of the resources (adjectives or nouns)
3) **Eventually, two ends will meet in a solution path**

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VIDEO

Brainswarming in Action

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Video link: https://hbr.org/video/3373616535001/brainswarming-because-brainstorming-doesnt-work

CLASS ACTIVITY

The Stuck Truck

As a class, let's do a Brainswarming activity.

- Be prepared to annotate the following slides
- Your facilitator will tell you the scenario
- (And will possibly give you clues…)

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Goal → Liberate truck from underpass

Verbs →

Refine the goal

Adjectives →
Nouns

Resources → Truck Road Underpass

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Decompose resources into component parts

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

De Bono Six Thinking Hats® Technique Overview

Objectives:

- Examine important decisions from different perspectives ("hats")
- Promote better decisions by pushing movement outside habitual ways of thinking
- Examine full complexity of the decision and identify issues and opportunities to which people might be blind

Approach:

- Recognize each Thinking Hat as a different style of thinking (explained on the next 3 slides)
- Improve the quality of decision making by looking at the decision through the perspective of each "worn" hat

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Adapted from: www.debono.com

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

De Bono Six Thinking Hats® (1 of 3)

Black Hat:

- Looks at things pessimistically and cautiously; helps to see why ideas and approaches might not work
- Helps to highlight weak points in a plan or course of action to spot fatal flaws and risks
- Helps to make your plans "tougher" and more resilient

Yellow Hat:

- Looks at things optimistically and positively
- Examines all the benefits of the decision and the value in it
- Helps to spot opportunities
- Helps you to keep going when things look gloomy or difficult

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Adapted from: www.debono.com

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The Six Thinking Hats technique helps you consciously utilize different perspectives by having team members "try on" different hats and move from their habitual ways of thinking.

Questions that can be asked to stimulate black hat thinking include:

Is this true? Will it work? Why it won't work? What are the weaknesses? What is wrong with it?

Questions that can be asked to encourage yellow hat thinking include:

What are the good points? What are the benefits? Why will this idea work? Why is this worth doing? How will it help us? Why can it be done?

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

De Bono Six Thinking Hats® (2 of 3)

White Hat:

- Focuses on available data
- Looks for gaps in knowledge and either tries to fill them or account for them
- Helps analyze past trends and pull ideas from historical data

Red Hat:

- Looks at the decision using intuition, gut reaction, and emotion
- Uses empathy to see how other people may react emotionally
- Attempts to understand the intuitive responses of people who do not fully know your reasoning

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Adapted from: www.debono.com

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Questions that can be asked to stimulate white hat thinking include:

What information/facts do we know? What information is missing? What information/facts would we like to have? How are we going to get the information? What is relevant? What is most important? How valid is this?

Questions that can be asked to explore red hat thinking include:

How do I feel about this right now? How cold or warm do I feel about this? How am I reacting to this?

CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

De Bono Six Thinking Hats® (3 of 3)

Blue Hat:

- Represents process control; often used by people facilitating meetings
- Invites different thinking styles to contribute:
  - Asks for Green Hat thinking when ideas are running dry
  - Asks for Black Hat thinking when contingency plans are needed

Green Hat:

- Represents creativity, by developing a creative solution to a problem
- Uncovers alternative ways of doing things
- Helps group use freewheeling thinking, in which there is little to no criticism of ideas

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Adapted from: www.debono.com

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Blue hat is unique as it thinks about thinking (critical thinking!). It involves control or organization of the thinking process, as well as instructions for thinking. Thinking sessions usually begin and end with the blue hat, which is normally "worn" by the facilitator. The blue hat controls the sequence or use of other hats, bringing in discipline and focus.

Questions that can be asked to encourage green hat thinking include:

What are some possible ways to work this out? What are some other ways to solve the problem? What else can we do?

CLASS ACTIVITY

Six Thinking Hats

As a class, let's choose a work challenge or decision that we can explore using the Six Thinking Hats approach.

- Six volunteers will wear the various hats
- We'll explore different perspectives

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Handout 5-6

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Session Topics

- Foundation Concepts
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- ***Types of Problems We Encounter***

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Types of Problems We Will Explore

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Verbal Intelligence: Complete the Phrase

1) 24 H in a D
2) 12 M in a Y
3) 7 W of the W
4) 64 S on a C B
5) 26 L of the A

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Logical Intelligence: Family Ties

If A is the son of Q, Q and Y are sisters, Z is the mother of Y, P is the son of Z, then which of the following statements is correct?

A) A and P are cousins.

B) P and Y are sisters.

C) P is the maternal uncle of A.

D) None of the above.

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Pattern Recognition: Count the Fs

How many times does the letter f (capitalized or lowercase) appear in the following sentence?

Finished files are the result of years of scientific study combined with the experience of years.

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VIDEO

Another Counting Test

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Lateral Thinking Problems: Solve the Riddles

1) My life can be measured in hours,
I serve by being devoured.
Thin, I am quick
Fat, I am slow
Wind is my foe… What am I?

2) What can you hold in your left hand, but never in your right hand?

3) A murderer is condemned to death. He has to choose between three rooms. The first is full of raging fires, the second is full of assassins with loaded guns, and the third is full of lions that haven't eaten in 3 years. Which room is safest for him?

4) Three switches outside a windowless room are connected to three light bulbs inside the room. How can you determine which switch is connected to which bulb if you may enter the room only once?

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Visual/Spatial Intelligence: Match Square

Make a square by moving ONLY 1 of the matches.

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Workplace Application (1 of 2)

An IT leader at a global training company needs new laptops for his entire department, but he has no budget. He proposes a trade to one of his company's existing clients: free laptops for his staff in exchange for free agile training for the client's employees. The client accepts!

In reviewing the company's Facebook account, a marketing manager notices that posts referencing sustainability and community engagement are generating the most "likes."

An auditor determines the root cause of a problem by examining data and sequentially eliminating a series of options.

Type of Problem
____ 1. Logical Intelligence
____ 2. Verbal Intelligence
____ 3. Inductive Reasoning
____ 4. Pattern Recognition
____ 5. Lateral Thinking
____ 6. Visual / Spatial Intelligence

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CRITICAL THINKING AND CREATIVE PROBLEM SOLVING

Workplace Application (2 of 2)

A production manager examines cases of injuries on the line and discerns that many injuries occur toward the end of long shifts. Based on this observation, she proposes changing from 10-hour to 8-hour shifts.

When presenting to a variety of stakeholder groups, an audit manager adjusts the formality, tone, and level of detail of her message based on her audience.

In planning for the return to on-site work, an office manager changes the furniture in the conference room (from long tables and chairs to sofas and coffee tables) to help facilitate more productive and collaborative teamwork.

Type of Problem
____ 1. Logical Intelligence
____ 2. Verbal Intelligence
____ 3. Inductive Reasoning
____ 4. Pattern Recognition
____ 5. Lateral Thinking
____ 6. Visual / Spatial Intelligence

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NEXT STEPS: BRIDGE WORK

Agile and Creative Problem Solving

Individually:

Read *Training Industry* article: "Agile Thinking and Creative Problem Solving in Times of Disruption"

https://tinyurl.com/apbjarrw

Read David Dame's blog on Scrum.org: "Agile is not a software thing. It's a problem-solving thing"

https://www.scrum.org/resources/blog/agile-not-software-thing-its-problem-solving-thing

Watch video: "Agile Leadership: Preparing for an Unconventional Career Path" by Emily Phillips – TEDxUW Milwaukee, 2016

https://tinyurl.com/vusbz56a

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https://tinyurl.com/vusbz56a

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Program Roadmap
Our next session...
PROGRAM PREP
CISS
Cubic Integrators
Explorer
Pathfinder
Business Builder
DiSC Behavioral Assessment
30 min
MONTH 1
1
Energizing People Through Effective Communication Part 1 (1.5h)
Energizing People Through Effective Communication Part 2 (1.5h)
MONTH 2
2
Building Trust and Connection (2h)
MONTH 3
Emotional Intelligence Essentials (1.5h)
3
4
MONTH 4
5
MONTH 5
Agile Concepts, Lean Thinking and Continuous Improvement (3h)
6
MONTH 6
Formation of Capstone Teams – presentation planning and preparation (1h)
Final Capstone Event – presentation and accomplishments
COHORT 1
Explorer/Pathfinder
Critical Thinking and Creative Problem Solving (3h)
COHORT 2
Business Builder
Strategic Thinking, Problem Solving and Decision Making (3h)
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ABOUT CORPORATE EDUCATION GROUP

Corporate Education Group (CEG) delivers talent strategies and development solutions that align with targeted business goals to transform organizational performance. From assessments to advisory consulting, program design, coaching, training delivery and measurement, we identify the right solutions to unlock business value. Our more than 30 years of experience rooted in corporate training enables us to engage in collaborative partnerships and taught us that there is no one size-fits-all solution when it comes to optimizing performance. Through our strategic alliance with Duke University Management Training, we offer premiere certificate programs backed by a renowned higher-education institution. Our practice focus is in Project Management, Business Analysis, Agile and Scrum, Lean and Lean Six Sigma, Management and Leadership, Business Process Management, and Business Relationship Management and our solutions are delivered in onsite, classroom, virtual, on-demand and blended settings. CEG is a PMI® Charter Global Registered Education Provider and a member of the Global Executive Council, an IIBA® Endorsed Education Provider, an APM Group PRINCE2® ATO, and an approved Channel Partner with the Blanchard Partner Network. For more information go to www.corpedgroup.com.

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