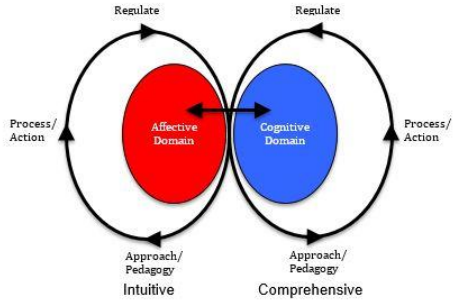
A Comprehensive Versus Intuitive Approach To Problem Solving

Conference
Conference
OS2

Overview

A Comprehensive Versus Intuitive Approach to Problem Solving



“ Success breeds success through one's approach of engagement, awareness of the process, and the ability to change course.

Frederick Moore, PhD

Problem Solving Approach

Approach to move towards something; a direction

If you randomly roll two dice and want the total to add up to eight

What is the probability that you will roll an eight?

Worksheet

What Approach Did You Use

Which approach(es) did you use?

- [ ] **Logic-based**
- [ ] **Visual using logic**
- [ ] **Memory-based (using formula)**
- [ ] **Intuitive-based using some logic**

Describe your approach

My Approach To Problem Solving

When you engage a word problem in a math course,
How do you set up the problem to be solved?

What steps to you take?

What is your approach?

Evaluate Your Approach

Does this approach work with all concepts and knowledge in math courses?

YES NO

If not, what modifications do you use, to maximize your success?

Is this technique something you teach to your students?

Comprehensive Versus Intuitive Approach

Comprehensive Approach

A methodical approach to problem-solving that uses a systematic way of thinking that explores all possible outcomes.

Intuitive Approach

The intuitive approach utilizes intuition and one's gut instincts and knowingness to approach the answer to a problem or solution.

Scenario Negotiating A Product

Account Executive

You are a businessperson who is negotiating the exclusive sale of your only product.

Option 1

Before the meeting, you calculate what is your break even number, and all possible variations of how you can make a profit, in anticipation of the direction the negotiations may potentially go during the meeting.

What is Option 1

Comprehensive Approach **Intuitive Approach**

Option 2

Before the meeting you researched previous tactics that the company has used before to license products, and your intuition is that they will push the negotiation in a particular direction. You spend your time before the meeting calculating the outcome of this particular direction.

What is Option 2

Comprehensive Approach **Intuitive Approach**

Which Approach would you use

Comprehensive Approach **Intuitive Approach**

Scenario Negotiating A Product

Virologist

You are a scientist who is trying to understand how a new virus utilizes a receptor on the surface of blood cells to get in the cell and attack the host. You develop a screen/assay and test all receptors on the surface of blood cells to see which one binds to the virus.

Option 1

Before your experiment, you study the literature on the role of receptors on the surface of blood cells and you choose a few candidate receptors as potential targets for the new virus. You develop a screen/assay a test those receptors to see which one binds to the virus.

What is Option 1

Comprehensive Approach **Intuitive Approach**

Option 2

You develop a screen/assay and test all receptors on the surface of blood cells to see which one binds to the virus.

What is Option 2

Comprehensive Approach **Intuitive Approach**

Which Approach would you use

Comprehensive Approach **Intuitive Approach**

Scenario Incoming Freshman

Student

You are a high school student who plans to major in mathematics when you go to college. Thereafter, you are interested in running a research lab and teaching mathematics at the university level.

Option 1

You have discovered through life experiences that you excel in math and science, and you gain satisfaction with understanding the math behind natural living structures. You also did a 5-week internship for an applied mathematics lab at Berkeley and loved the work they were doing. Lastly, you tutor high school and middle school students in mathematics.

What is Option 1

- **Comprehensive Approach**
- **Intuitive Approach**

Option 2

You met a mathematician that does research at Google in their life science division when you were in middle school. She explained the mathematics behind living structures and organisms, and explained the growing field of biomimicry. At that moment, you were inspired and had a strong desire to become a professor that does research and teaches mathematics at the college level.

What is Option 2

- **Comprehensive Approach**
- **Intuitive Approach**

Which Approach would you use

- **Comprehensive Approach**
- **Intuitive Approach**

Comparing Approaches

Is One Approach Better Than the Other?

Comprehensive Approach

Pros	Cons
Objective & non-biased	Requires discipline
Exhausts all possibilities	Can be more time-consuming
Uses logic-based deductions	Solution may not be logical

Intuitive Approach

Pros	Cons
Can accelerate answers	Can prolong answers
Solution may not be logical	Can be biased
Strengthen intuitive-based knowingness	Emotions may cloud judgment

Evaluate Your Approach

What approach do you use to teach concepts and content in your course(s)?

- Comprehensive Approach
- Intuitive Approach

Does your approach vary based on the concepts or content of the course?

- YES
- NO

Describe your Approach

Have you evaluated if your approach to teaching concepts in your course are effective for students with varying approaches to learning?

- YES
- NO

What process do you utilize to ascertain if your approach is effective?

If not, is there a way to evaluate if your current approach is effective?

Scenario Calculus Student

Student

Imagine yourself as a student that has studied hard for a calculus class. You did all of the problems at the end of each chapter and took a practice exam one day before the real exam.

You scored a 90% on the practice exam.

On the actual exam the next day, you felt anxious and you only finished 70% of the exam.

In addition, you are not confident that you answered the questions that you did answer correctly.

What approach would you use to identify the problem(s) that may be affecting your math class and how would you fix it?

What type of questions would you ask yourself?

Understanding Your Process

As it takes discipline to be conscious of the approach that one takes when pursuing a goal, task or activity.

Is this something valuable to teach students learning mathematics?

YES NO

Figure 1 depicts the steps necessary to analyze one's process and refine for optimal results.

What things can we put in place as instructors to support students developing this awareness?

Enter 8

Working Session Assignment

Create a group of 3-5 instructors based on a specific course.

Spend the next 45 minutes accomplishing the following:

- Create at least two different approaches to solve a math problem

Keep in mind an intuitive versus comprehensive approach to problem solving.

- Describe pros and cons for each approach.
- Discuss ways for students to check their results.
- Provide examples of common errors that students may face when solving the problem.
- Demonstrate ways instructors would teach the math problem to their class.

Be prepared to present a 5-7 minute presentation on your work.

Working Session Worksheet

Approach Type

- Comprehensive Approach
- Intuitive Approach

Approach Description

pros	cons

Ways to Check Results

Common Errors

Ways to Check Results

Working Session Worksheet

Approach Type

- Comprehensive Approach
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Approach Description

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