Creativity, Problem Solving and Innovation

This Course is created

by Anil S. Patel Ph.D. in Seattle, USA

Supported by Anil and Asha Patel endowment fund
for creativity course for Gyan Daan to your educational institution

Creator of the course & his wife as key reviewer

Anil S. Patel, Ph.D.

Asha Patel, Ph.D.

Marwadi University

WARNING FOR THE ENTIRE COURSE

This class presentation is for purely educational purpose. In order to avoid plagiarism charges to the individual doing so and to your educational institution to which this course is donated under a MOU, this presentation must not be copied and distributed, published or sold in any format.

It is created and donated solely for the use by the teachers of your educational institution for teaching the class on Creativity, Problem Solving and Innovation.

CREATIVITY, PROBLEM SOLVING AND INNOVATION

Week #2

Ask Questions

Confidential Course created by Anil S. Patel, Ph.D. in Seattle, USA

SPECIFIC DISCLOSURE FOR WEEK # 2

- Most of the text for contents of this class is from “Zig Zag” book by Keith Sawyer (ISBN 978-1-118-2929770-4) and “Cracking Creativity” book by Michael Michalko (ISBN 978-1-58008-311-9). This class presentation is for purely educational purpose with needed modifications and additions from above sources. In order to avoid legal charge of violating copyright protection and also to avoid plagiarism charges to the individual doing so and to your university, this resultant presentation must not be copied and distributed, published or sold in any format.

Important for this and all classes of this course

For maximum benefit from the course

Required strict Time Management especially during Individual Test and Group Test

Important reminder for you as teachers

- Please keep in mind while experiencing this FDP training that this course is designed for undergraduate beginning students and not for you.
- Please follow instructions for both tests and experience full participation which will help you as a teacher when you teach the course to your students with expectation of their full participation.
- Do not judge your own experience with this course and its training without considering above two important caveats.

Session Flow as Learning Objectives

- Various practices of asking questions
- Find the right question
- Method of questioning , Ask 10 questions
- CIA method of questioning
- Find the bug
- Importance of asking the right question
- Reversal questioning, Search and Squeeze

Learning Outcomes

- Various strategies to ask questions as per above for creativity and problem solving

Creativity , Problem Solving & Innovation

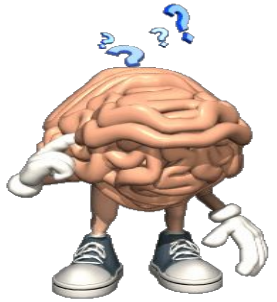
- Most creativity starts with either a problem prompting a question or a curiosity asking a question.
- "The formulation of a problem is often more essential than its solution" ----------Einstein.
- Exceptional creative people ask questions no one has thought before.
- Creativity and creative problem solving comes more from asking bold questions than finding "right" answers.
- Even simple questions have lead to fundamental advances in science.

Asking Questions

"The most serious mistakes are not being made as a result of wrong answers. The truly dangerous thing is asking the wrong question."

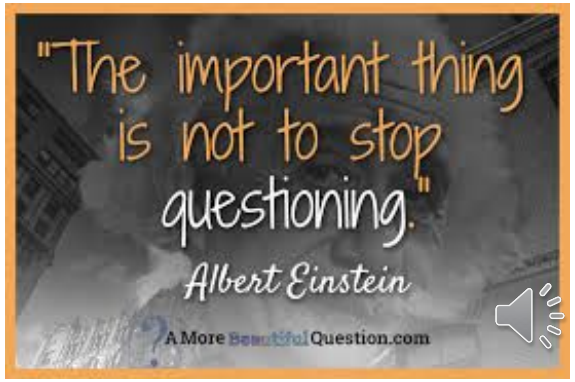
--------Peter Drucker,(Management Guru)

CPI-W2-1 CCm 17.34 Why do we ask questions Michael Vsauce Stevens at TEDxVienna.mp4



Asking Questions

- All creative persons in arts and sciences ask questions.
- Einstein was like a wonder-filled child, always asking the obvious questions about space, time, and God.
- He once said that the ordinary person could learn all the physics he or she will ever need to learn if the person could learn to understand the mind of a child.
- Isolate the challenge you want to think about.



1st Practice of Asking - Find the question

- If you spend your time on wrong question you will fail.
- Asking a right question is necessary and how do you find a right question?
- This requires generating a lot of good questions leading to surprising versions of the problems which most likely lead to creativity.
- Problem finding requires you to loosen up and improvise towards figuring out creatively.

Let's Exemplify-Try Ten questions

- Write down as many as ten different formulations of your problem, all in one setting.
- Try to make them as different as possible from each other.
- Working quickly without break will force your unconscious mind to generate mixture of ideas.
- Do not allow your conscious mind to censor any idea, otherwise you will generate ideas that are "sensible" rather than creative, surprising and original.

The Mice Problem

The author of the book Zig Zag made up 10 questions in 2 minutes

The Mice Problem 10 Questions:“How can I build a better mouse trap?” Here are the possible 10 questions:

- How do I get the mice out of my house?
- How do I catch mice?
- Why are there mice in my house in the first place?
- How do they get in?
- What is the best way to kill a mouse?

Five more questions on next slide

The Mice Problem 10 Questions:

- How can I keep the mice from getting inside in the first place?
- Why do mice exist in the first place, and how can we force them into extinction?
- What does mouse want? How can I make my back yard more attractive than the inside of my house?
- How can we persuade all the mice to leave our neighbourhood?
- What if mice were so expensive that bounty hunters roamed the neighbourhood looking for them? How can I raise the price of mice?

Mice problem continued by author

- The 10 questions are far from perfect but it is okay. He is on his way for some unexpected solutions.
- He picked questions related to keeping them out of the house by sealing it and making the backyard more attractive to them.
- But result leads to a brand new problem to tackle, very different from original challenge of building a better mouse trap.
- It is worth asking as to how you find out where the entrance sites are in order to seal them. This may lead to another set of questions.

Find the Bug

- Debugging or finding and fixing errors can be a boost to creativity.
- Thinking about inadequacy or inconvenience leads frequently to creative new ideas as solutions for improvements as illustrated in next set of slides. Please go through them very quickly to avoid running out of time later on.

Some interesting innovations out of bugs

Rain cannot bug me now!

Some interesting innovations out of bugs

I can eat fast without burning my mouth!

Some interesting innovations out of bugs

Drops will now go in the eye & not on the face!

Some interesting innovations out of bugs

I can stand & sleep in train without banging my head –two different ways!

Some interesting innovations out of bugs

I can stand & sleep in train without banging my head –two different ways!

Some interesting innovations out of bugs

I can now collect rain water!

Re-interpret

- Many times a solution for a problem can be reinterpreted as a solution for a new problem.
- Mention other usage of this screw driver.

- Give example of a long screwdriver usually used to tighten a screw can also be used for retrieving an unreachable fallen screw fallen deep in a dishwater by sticking a chewing gum at the end of the screw driver and retrieving the screw by pressing the chewing gum to it and then retrieving it thereby.

Rise to the occasion

- Keith Sawyer paraphrased some questions based on a list of 40 questions originally developed by CIA called Phoenix including
  - "How will you know when you have succeeded?
  - "Can you use this problem to solve some other problems?
- Let us personalize and extend the list by formulating our own good questions.
- It is worth adding "Can I think of someone else who might have already solved a similar problem, even though context was very different?"

CIA method of questioning

- Why does this problem need to be solved?
- What benefits come from solving the problem?
- What don't you understand yet?
- What information do you have? Is it sufficient? Is it contradictory?
- Put a boundary around the problem , be clear about what is not the problem.

Continued in next slide

CIA method of questioning

- What are the various parts of the problem? Identify and describe the relationships among the parts.
- What cannot be changed about the problem? (Don't assume something can't be changed when in fact it can.)
- Think of another case of this same problem, but perhaps in a slightly different form, or in a different area altogether. Can you use the same solution, or the method that led to that solution?

CIA method applied for already discussed Mice Problem

Please go through them quickly

1. *Why does this problem need to be solved?*

Because mice are unsanitary, and they're in the kitchen cabinets busting into my wife's flour and sugar and my Honey Nut Cherries.

2. *What benefits come from solving the problem?*

If I get rid of the mice, my family's food will be safe from germs and unsightly mouse droppings.

3. *What don't you understand yet?*

I don't understand how these mice are getting into the house.

CIA method applied for already discussed Mice Problem

4. *What information do you have?*

I know the mice are in the house because I find food bags torn open, and I find mouse droppings.

5. *Put a boundary around the problem*

I can't destroy the house. I can't endanger my family's safety by poisoning the food in our pantry to kill the mice.

6. *What are the various parts of the problem?*

Keeping the mice out: killing the mice if they get in: protecting the food so it's harder for mice to get to it.

CIA method applied for already discussed Mice Problem

7. *What things cannot be changed about this problem?*

I absolutely cannot tolerate a mouse in the house (even if it's not eating my cereal or shredding my soap).

8. *Think of another case of this same problem.*

Years ago I had ants streaming into my kitchen. I couldn't seal up all the gaps in my house because the ants were too small and there were too many tiny ways to get in. The solution was to place poison on the anthills outside the house.

2nd Practice of asking

- Search the Space:
  - Many times it helps to expand your search beyond what you start with. For example instead of searching for better mousetrap, you may end up with a more creative solution to figure out how to keep the mice from entering the house which is entirely different area of solution space.
  - There are techniques designed to help you examine entire space as we will see in Week 4 with Fishbone diagram and Mind mapping techniques.

2nd Practice of asking

- Transfer the problem:
  - This practice of asking question can shock you out of your assumptions as per the following examples.
- Reverse the technique:
  - Small pox
  - Assembly line

Please summarize the two stories quickly in your own words as given in next 2 slides instead of reading them to save time.

Story #1:

In 18th century lethal smallpox was very prevalent and no remedy worked. Edward Jenner; a British physician in 1796 reversed the question and asked why milkmaid who got cowpox rarely got smallpox, he asked why not?

The answer was that they were immunized by exposure to cowpox which is harmless. He extracted some pus from the milkmaid's cowpox and injected into an 8 year old boy who after two months was injected pus from a fresh smallpox lesion and he did not get sick. Jenner named his invention as "vaccination" after Latin word vacca for cow.

His simple reversal of the question from "how can we prevent smallpox?" to "Why don't milkmaids get smallpox?" resulted in solution as invention of "vaccination" for preventing smallpox and subsequently many other diseases by appropriate immunization.

Story #2:

Similar illustration of reversal comes from the automobile industry. Initially workers were coming to car frame and installing various parts one by one until the car was built.

This slowed down production down production, Mr. Henry Ford turned the question around and asked "How can I get the car frame to work team?"

The answer gave rise to the assembly line where work team stays in one place and install various parts to quickly assemble car resulting in higher rate of manufacturing cars compared to previous process .

This forever changed American manufacturing for car and many other products. Such manufacturing process also is now globally used even for sorting ,shipping etc many other functions.

2nd Practice of asking

- Reverse the assumption:
  - Suppose you want to start a new restaurant and are having difficulty coming up with ideas. To initiate ideas, try the following reversals.
  - List all your assumptions about your subject.
  - Example: Some common assumptions about restaurants are
    - Restaurants have menus, written, verbal or implied.
    - Restaurants charge money for food.
    - Restaurants serve food.

2nd Practice of asking

- Reverse each assumption. What is its opposite?
- Example: The assumptions reversed would be
  - Restaurants have no menus of any kind.
  - Restaurants give food away for free.
  - Restaurants do not serve food of any kind
- Ask yourself how to accomplish each reversal.
  - How can we start a restaurant that has no menu of any kind and still have a viable business?

A restaurant with no menu.

Idea: *The chef informs each customer what he bought that day at the meat market, vegetable market, and fish market.*

He asks the customers to select items that appeal and he will create a dish with those items, specifically for each customer.

A restaurant that gives away food.

Idea: *An outdoor cafe that charges for time instead of food.*

Use a time stamp and charge so much for time (minutes) spent.

Selected food items and beverages are free or sold at cost.

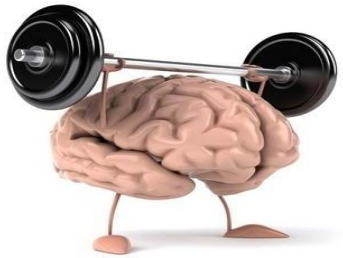
A restaurant that does not serve food

Idea: *Create a restaurant with a unique décor in an exotic environment and rent the location.*

People bring their own food and beverages (picnic baskets, etc.) and pay a service charge for the location.

Discuss the reverse assumption examples about restaurant seeking comments from students

Its now time for



Individual Test for 5 minutes:

Write your name
Take an index card for monkey problem.
Use both the sides of the index card.
Time allocated is 5 minutes.

Test Details

- Problem is to prevent monkeys from eating away the fruits and crops in the farms around a village or food from terrace or balcony of homes in towns.
- Raise and write questions only and no answer or solutions related to prevention of the monkey problem.
- Your questions go here……

1. Where do the monkeys come from?
2. _____

To

10. _____

Bathroom break for 5 minutes

Please only for those who must & others just relax.

Remember strict discipline of time which must be observed by all.

Go Back From the Future (BFF)

In searching for creative solutions, most people look forward from the present. Instead, why not visualize your goal, and then work backward to your current situation?

It has been widely used to solve technical problems of all kinds.

Also such thinking helps reaching a well defined goal.

Examples of BFF; Imagine you have reached Jupiter while avoiding needed huge booster rocket to prevent damage to delicate instruments? How can this happen?

Back From the Future thinking leads to launching date for the probe with smaller booster rocket such that while passing by Venus its gravitational force will swing the probe around and give extra velocity needed for it to reach Jupiter. In 1989 Galileo probe used this BFF thinking to reach Jupiter after five years.

A practical example of how you can work backward for travel to reach destination at preferred time is when you want start from Mumbai to reach Calcutta during morning . You work backward to select route from many possibilities.

Pick the Worse Idea

- Paradoxically, bad ideas, even the "world's worst," can lead you to good ones.
- Start by listing the absolute worst ideas you can think of.
- Then try to identify potentially good features of these Terrible concepts.

Pick the Worse Idea

- At Woolmark-the wool manufacturing trade group was in charge for changing the image of wool from something your grandmother wears to a stylish, modern material. They had a small budget and a fixed schedule: the promotion would take place during New York City's high-octane fashion week.
- One of their "world's worst" ideas was, "Let's run a herd of sheep through Times Square and disrupt traffic." A crazy notion, but once an idea like this gets on the table, it sticks around in your subconscious. So later, when one of the team members spied a typical New York dog walker with ten dogs on ten different leashes, they knew they had found the right question: "What if we put sheep on the ends of those leashes?"
- And so was born the incredibly successful Sheep- walk ad campaign, in which leggy, high-cheekboned models paraded sheep up Manhattan's elegant Madison Avenue

Search and Squeeze

- Transform your problem by stretching it, to make it a broader, more universal question, or squeezing it, to create a narrower, more tightly focused question. These two exercises work because when you're stumped, it's often because you're pondering your problem at the wrong level of abstraction. Stretching makes it more abstract; squeezing makes it more concrete.
- Stretch by using the Five Whys technique-keep asking why, up to five times, until you get to a powerful new formulation of the problem:

Search and Squeeze

1. Why don't I have a friend?
- (Because I don't meet any people)
2. Why don't I meet any people?
- (Because I have a demanding home duties and I have no spare time)
3. Why is my time at home so demanding?
- (Because I’m committed to the home duties)
4. Why am I so committed to your home duties?
- (Because my home duties are making a real difference to my family)

You know you're on the right track when the "whys" get you to a new "how" question:

5. How can I stay committed to my home duties and still have time to socialize more?

Search and Squeeze

- Now you've arrived back at a concrete question, but an entirely new one that could actually yield a creative solution.
- The secret is that the new question, informed by a broadened look at your life and your values, actually gets at the root cause of your dilemma.
- The first question turns out to be a symptom, and most likely a temporary one now that you know how to treat it.

Search and Squeeze

- You also need to transform your problem when it's too *big* to be solved all at once.
- As an example a problem like "I'm not happy with my job" is just too sprawling and vague to solve, even for the most creative person on earth.
- Break it down into smaller problems by listing the reasons you're unhappy about your job:

Why am I am unhappy with my job ? Break it down into smaller problems.

Listing the reasons you're unhappy about your job:

1. My commute is too long.
2. The work is boring.
3. My boss isn't nice to me.
4. My boss wants me to be available 24/7.
5. I don't make enough money.
6. It is just not fulfilling.

One of these smaller problem might already suggest a solution. If not take the big problem and *Squeeze* it by asking “who”, “what”, “where”, “when” and “how” questions as shown in next slide.

Squeeze the question of unhappy with the job

Who at your job is present when you feel unhappy?
(Maybe there's a personality conflict that's coloring your entire day.)
What tasks make you unhappy?
(Maybe you just need to ask for more responsibilities, or different ones, or less pressure.)
Where are you when you're most unhappy?
(Maybe it's only at the morning meeting, because the atmosphere's so competitive and aggressive.)

Squeeze the question of unhappy with the job

When does this feeling of unhappiness strike you?
(Maybe it only hits on Sunday evenings and Monday mornings, and the real problem is that your weekends aren't satisfying, so you dread starting the workweek unrefreshed.)
How do you react when you feel unhappy?
(Are you snapping at your coworkers or retreating into a dark mood, thus feeding a vicious cycle)

Squeeze the question of unhappy with the job

You know you're on the right track when *squeezing* gets you to a concrete statement of the problem that's so obviously accurate and specific, you're halfway to a solution already.

The risk with *squeezing,* though, is that you can end up with a question that's so narrow that it contains an invalid assumption as shown in next slide .

Risk of assumption while squeezing.

You can end up with a question that's so narrow that it contains an invalid assumption.

Risk of assumption while squeezing.

- Maybe you squeezed your "Why don't I have a friend?" question until you reached a lot of practical questions about where and how to meet more people.
- But these "friend" questions have a built-in assumption: if you meet more people, you're more likely to find a friend.
- Perhaps the problem isn't that you never meet people, though.
- Perhaps the real problem is that you act shy when you meet a person, or you don't feel good about yourself, or you're not a lively conversationalist.
- Make sure to search the space before you squeeze your question.

Its now time for video on Questions

CPI-W2-2 CCm13.30 How to Ask Better Questions Mike Vaughan TEDxMileHigh.mp4

Discuss this video : What is the key message?

Its now time for another video of a young Indian asking question about creating clean water

The following case study video illustrates employment of some of the list of questions as a young scientist of Indian background rise to the occasion for attempting to debugging water to make safe drinking water.

CPI-W2-3 m8.03 A young scientist's quest for clean water DeepikaKurup_2016W-480p-en.mp4

Concluding remarks before the group test

Please note that “Ask”, the first step in your journey in this course, just might be the most important. You'll find yourself returning to the techniques in this class more than those-of any of the other class because QUESTIONS is where creativity begins.

Then, once you've pinpointed your creative challenge, you need to become a master, an expert in the kinds of knowledge that are related to your challenge. That sounds daunting, but I don't mean you need to master every aspect of every related field.

You simply need to know how to find the information you need, hone the skills you require, and keep new inspiration streaming in. This will be covered in one of the future class on “Learning”.

Finally lets have a.....

Group Test of 20 minutes

Lack of cleanliness in public places in India

Group Test of 20 minutes

Lack of cleanliness in public places in India

Similar to last class each student thinks and contributes for the group at least 3 questions to create a list of at least 18 questions and perhaps many more questions related to **lack of cleanliness in public places in India.** Each student is given an index card for verbalizing first and then writing on his/her index card any new question which is yet not given thus far to the group with following rule.

Teacher randomly selects a leader who starts and sequentially gives opportunity to verbalize and write his/her one new question in as short a time as possible but no more than1.0 minute. It is the turn of next student with similar restriction to give his/her question.

Group Test of 20 minutes

Lack of cleanliness in public places in India

Others keep thinking for his/her turn and each student must contribute at least three new questions not given yet by others by the end of 20 minutes. The rotation continues for 20 minutes and this process can generate minimum 18 and maximum much larger number of questions related **lack of cleanliness in public places in India**. A reminder: Group generates only questions and not any answers. There is no limit beyond minimum 3 points/ student. All index cards are submitted to the teacher who puts on a bulletin board for the entire class to see outcome from all groups. **Voting for 10 best questions can be done like last week.**

In a later class we will revisit this question of cleanliness for possible answer(s).

Interesting for you here!!!

Show Optional Video of about 7 minutes only if time will remain for at least a few minutes to allow regrouping after group test for 20 minutes. Other wise after group test if there is time or ask students to watch on their own time when possible from the university server.

CPI-W2-4 m6.48 15 Most Unusual Restaurants Bars & Café in India !!.mp4


Thank You!