

Introduction to Biomimicry
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Lecture – 34
Developing Creative Confidence

(Refer Slide Time: 00:21)



Now I also want to take you to, yes, the mind map. I am sure many of you have started to do the mind map. The only thing why I introduce the mind map now is because when we did the mind map last time, I did not tell you how to use the mind map for biomimicry. But I guess all of you are intelligent enough to have figured out how the mind map can be used for biomimicry. In any case, let me tell you. Now, what is the mind map?

What is it? What do you see in front of you? What you see is information on how to make mind maps and you see the connection between one type of information and another type of information. You also see thick lines that have one particular word which tells you that this particular line is about for instance, paper. Now, paper is what comes out of the centre of the page, which means we are thinking about paper.

And then we are thinking about the subsets of paper, we are thinking about landscape paper, we are thinking about blank paper, we are thinking about start with the centre and that centre

is connected to the landscape, so there is lot of connections. You have learned systems thinking which is about connections. You have learned mind mapping which is about representing or putting on in front of you all the thinking that is going on in your head.

Now, cannot you figure out or you can figure out how to use this for biomimicry. For instance, define, you can use it in the define stage by putting define at the centre and all the definitions, all the how might we questions. So, all the broad questions, all the narrow questions, all the just right questions. You can also put all the questions around the page and how did you arrange?

So, therefore the thick line can have how might we something, something, something, and the thin line from that can say what is the connection between that how might we and something else that you thought about. You can also use it for discover. In discover what do you do? You look at so many organisms, 7, 8, 9 organisms. You can draw a quick mind map of all these organisms and look at the connections.

For instance, supposing you say one of the organisms to discover is the Kingfisher and you can look at the strategy of the Kingfisher, the thinner line can read strategy, the thinner line can be the context of the Kingfisher, one more thinner line could be how the Kingfisher solves the problem. The splashless dive that we keep thinking about can be one thin line. It is a great way to look at abstract, it only helps you. What is mind map after all?

Mind map is a tool to help you look at the information and the interconnections between them among that information. And then you can start to unearth new things. So, you can also use mind map for abstract. Every organism you start with there is an abstract stage. You can put all the abstractions on the mind map and finally when you have finished all the seven steps, you can use mind map for define what are the thin lines, discover what are the thin lines, biologize what are the thin lines, etc.

You can even connect it to the UN SDGs. You can even put all the UN SDGs and find out which UN SDG is connected to your solution. Just play around with the mind map. Use the mind map for instance, become a good mind mapper. When I say good does not mean you need to draw great pictures. Become a person who uses mind map more often. Instead of having to remember things mind map is essentially a tool for helping you remember things.

You know when you are having an important phone conversation with the client, you can use mind maps. You can use a mind map and you go shopping so that you do not forget something that your mother or father asks you to buy. And mind maps are, therefore, a tool that you can enjoy and can actually put to use for biomimicry. So have fun with mind mapping.

(Refer Slide Time: 05:14)

CREATIVE CONFIDENCE
Belief that every one of us is creative
and putting that belief to work



Creative confidence is like a muscle
that can be nurtured and
strengthened



We are now going to learn a little bit about creativity because you will agree that this course is actually can be termed as part of a creativity program. Many times, when I teach creativity, I include biomimicry. So, I told myself, when I am teaching you biomimicry, why cannot I include creativity. Because what I am going to talk to you over the next 10 minutes is to give you the confidence that every one of you is creative.

You know, there is no point asking you to solve a huge problem like the United Nations Sustainable Development Goal problem and taking you through the process of biomimicry and asking you to come to an implementable solution if I do not infuse in you the confidence about creativity because if you are not confident that you can solve the problem, then you will not solve it. So, suddenly Mrinalini and I said, we need to talk about creativity which is why I am going to be speaking about helping you understand creativity over the next 10 minutes.

Look at this slide. What does it say? By the way that is a lovely picture on the tree. You just get your imagination running completely, a hand holding the tree, actually it is just an

artificial hand, but look at the beauty, the symbolism of that hand there, that all those fingers holding the trunk. So, what is creativity? Creative confidence is a lovely word to use because the minute you say I have creative confidence, it means you are all ready to go.

Believe that every one of us is creative and putting that belief to work. The first thing is belief that every one of us is creative. You know, it is so difficult I do not know why, it is so difficult to teach this belief. I do not understand why the minute I ask a group of students, how many of you are creative? Very few put up their hands, why? Or they say my mother is very creative. My sister is very creative, somebody else is very creative, why?

Why is it that we do not believe that every one of us is creative? I am not even trying to inspire you or motivate you with this sentence, but is not it? I mean just think about it logically, if creativity is doing something different, something new solving a problem, then do you mean to say that when you do not raise your hand for the question how many of you are creative, do you mean to say that you have not solved a problem in your life?

Do you mean to say you have not thought about new ideas? Do you mean to say you are not thinking about new problems? Do you mean to say that you are not trying to figure out things? Yes, that is creativity of course, you are doing. You know, suddenly very hungry and there is no food to eat, what do you do? You look for something, right? You look for an alternative. So instead of chapatis or instead of rice, you will probably eat a chocolate because you want to satisfy your hunger.

Now that act, that act of choosing a chocolate instead of roti or chapati is what is called alternative. And alternative is looking for something instead of something else and that is one of the cornerstones of creative thinking. Looking for alternatives is very critical to creativity. Are you telling me that you have never looked for alternatives in your life? So therefore, every one of us is creative and using that creative, putting that belief, once I know I am creative, what am I going to do?

I am going to go and solve the problems. Once I know I am creative, I am going to teach biomimicry. Once I know I am creative, I am going to solve the United Nations Sustainable Development Goals because there is no choice, what else do I do with my creativity? Look at

this. Creative confidence is like a muscle that can be nurtured and strengthened, which means we are learning what?

We are learning that every one of us is creative, yes, but many of us can learn to be more creative than somebody. So, we can learn creativity tools, we can constantly solve problems, we can enter competitions. We can go constantly be thinking about how to solve problems. We can take risks. We do not have to accept the solution that is already there, we can look for better solutions. These are the things that we do to nurture our creativity, to build what is called creative muscle.

I wish I had the time to give you what is called 30 exercises to make creativity a habit. I had once upon a time written down 30 daily exercises that you can do, maybe I can send it to you later on. But every day, you can do an exercise just to increase, for instance one of the exercises could be, of course, you may get into trouble at home, one of the exercises could be to just rearrange the furniture in your house.

Just rearrange it because one of the things about creativity is empowerment. You empower yourself to be your interior designer for that day. And you go and you rearrange the furniture, put the cot here, put the chairs there, put the rug here, and completely rearrange it. Of course, you may get into trouble, but that does not matter because creativity is also about taking risks, is also about empowerment, saying I have the power to rearrange, I know how to rearrange it.

It may not be the best thing, but that is one habit I keep recommending to people to do. The other habit is to use the senses. For instance, when you are watching TV, put the sound off and try and find out what the persons are talking, what the actors are saying, of course without the subtitles. So, you can do several things. There are about 30 exercises that you can do. You do these exercises every day and at some point creativity becomes a habit.

And you are going to be surprised because all your friends are going to come and say what is this, nowadays you are giving us so many new solutions, where did you learn it from? Creativity becomes natural.

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thinking. There is something called lateral thinking which helps you generate out-of-the-box ideas.

There is something called six thinking hats, which helps you look at different aspects of thinking. There is TRIZ which helps you solve problems. There is design thinking, which is a tool for going from problem to solution. And of course, biomimicry our all time favourite, it is also a tool. So therefore how to think, how to use tools for creativity? Believe we just learned about belief, how important is it to have belief in creativity?

Inspiration, look at inspiration as part of creativity. Without inspiration, what will we be? What am I trying to do now? I am trying to inspire you to solve problems. Process, I have actually made process very bold here because many of us think that ideas come automatically, which is not right. There is a process; there is a step-by-step process from problem to solution, which is what you learned in this spiral.

That there is a step-by-step process. The biomimicry spiral is a step-by-step process. You will always find it. You have a problem. Suppose I have a problem and I do not directly go to the ideas. I have the problem, I define the problem. I look for information on the problem and then I redefine the problem. Find out what is the real problem and then what do I do? I look at. Let me give you a personal example.

Supposing, just supposing I want my children to learn English this is the problem. Now I have a problem and I want to solve it. Now, can I find a solution just like that? No. What do I have to do? If I really serious about the problem, what do I have to do? First and foremost, I must look for information about my children. How serious are they? How much do they like English, etc.

Look for information, how much of hard work they can put in and all that. And once I get this information, I start looking at the problem and I say can actually redefine the problem. Is it really learning English that I am looking at or something else? What are the different connotations? Can I change the verb learn to something else? Can I say I want my children to fall in love with English? I want my children to speak in English.

I want my children to converse in English. I want my children to understand English. Look at all the connotations. What is it that I really want for my children? And then I say wait, what I really want, I want them to fall in love with English. So, the whole problem changes. What started as learning English has now become falling in love with English and therefore what you will find? Every time you change the definition, new ideas come in.

The ideas that are valid for learning English are no more valid for falling in love with English. So now I have a problem, this is the problem, I think I have taken a risk here. I think that this is the problem I want to solve. I want my children to fall in love with English. What do I do next? I look for ideas. What are the ideas I can get? One idea can be I can send them to England and they can fall in love with English there.

I can make them watch movies, I can make them read newspapers. I can put them up with a family that speaks only English. Four ideas. Quickly, I got these ideas. Now, what do I have? I have four ideas. But I cannot work with all four ideas, so what do I do? I have to choose one idea. So, therefore I start to define looking for information, redefine, ideate, choose an idea. What idea will I choose? I like the idea of sending them to England, I choose the idea.

Now next what? I cannot immediately put them on a plane. There are some problems with that idea. So, I have to tailor that idea or shape that idea. What do I do? What are the problems? It is too expensive to send them. Where will they stay? The information is my children may be asthmatic and therefore they cannot go to England in the winter which means I already have three problems.

They cannot go to England in the winter, it is too expensive to send them and where will they stay? And I look for answers for all this. I look for answers. These are implementable solutions. I go to the bank and borrow some money or I call a friend of mine and say can you accommodate my children for two months? And then I see to it that I sent them during the summer. And finally, what do I do?

In summer I put my children in a plane, call my friend I requested to accommodate my children and let them live in England for 2 or 3 months and let them hopefully fall in love with English. Look at the process, look at the process of creativity. I started with defining a problem and then I looked for information. So problem definition, looking for information,

redefine the problem, look for ideas, choose the idea, shape the idea and implement the idea that is the process of creativity.

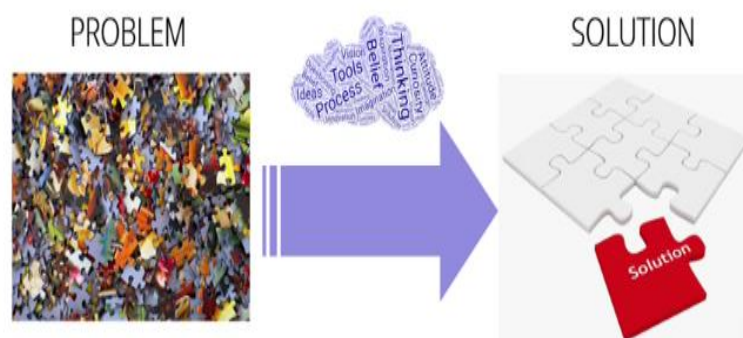
It is not just standing and suddenly getting some ideas. And all of us do this all the time. Do not be surprised that I am giving you something new. Just look at the way you have solved a recent problem. You have done all these things. You have just not named it that is all. This is called deliberate creativity. I purposely go from problem definition to solution implementation. So, therefore we understand that creativity is a process.

There is also imagination which you will also learn later. Imagining things, visualizing things. When I was working with the Delhi Daredevils, we all sat down and visualized the entire match. Look at the power we have. We can see an entire map before it actually happens. It was great fun. At the same time, it helped us understand what could happen in a match. And once you start using your imagination, you can start to say this is the problem I want to solve.

For instance, why are we not imagining a city under the sea? Why are we constantly thinking of building houses on land? You know why because we really have not imagined it. My favourite line which I am going to repeat often is that if there is no solution for something right now, it is because you have not imagined it. And therefore, suddenly we are learning there is so much to creativity. And one of my favourite words is hiding there, which is empathy. So why am I talking about empathy? Let me tell you why.

(Refer Slide Time: 22:06)






The Creativity Journey



This is the creativity journey, we just saw that. We start with problems and then go on to solutions. And it is a journey. It starts with the problem, it ends with the solution. And of course, when you start with the problem, end with the solution, you make use of all the tools in the middle from the canvas. It will be nice to know what you can add to the canvas that I have not already mentioned.

(Refer Slide Time: 22:38)

When do we use Creativity?

-  Creativity in a crisis
-  Creativity to improve the condition of the world
-  Creativity to change your life or improve your life
-  Creativity for someone you love
-  Creativity for a meaningful life

When do we use creativity? We use creativity in a crisis. All of us do that. Suddenly you get a call saying that so and so is in hospital and you have to do something, you have to be able to reach the hospital or you have to be able to help the person in the hospital. Immediately you will think of new ideas. Creativity to improve which is what you are doing with the UN SDGs. What is the UN SDG after all?

They are problems that the world has and you are using your creativity or using biomimicry to improve the condition of the world. Creativity to change your life or improve your life. You know you are not very happy with what you are doing, it may be a job, it may be a school, it may be studies, it may be friendship, it may be anything at all and you want to look for new things in your life to use creativity.

You find out how you can change your job, you find out how you can earn more money, maybe you can learn music, become a music teacher or by the way you know during college when I had to earn some money because I had to pay for the college fees, I actually learned French and teaching French gave me a lot of money. But the idea to learn French came because I use creativity.

I asked myself what else, can I do other than for working, for earning some money and because I like languages French was the first idea I got. Creativity for someone you love, always right. It is always so true. How because we love someone, we do things for that person, we create new ways of nurturing that relationship, of bringing up our children because you love them.

We do so many things, so many things to solve problems for people we love. I do not know if I think I have already spoken to you about the four fears. One of the fears of course is that I will lead a meaningless life, every one of us wants our life to have some meaning. It does not have to be big meaning, small meaning, great meaning, Nobel Prize winning meaning, nothing. And many times, we use creativity to find out how you can lead a meaningful life.

Many of my friends, they say I want to settle down here, I want to help this. I have a friend of mine who is helping so many parents and children in need. For him that gives the meaning. Now, how does he think of those ideas? And all of us, not just that person, all of us want to find meaning. And when you want to find meaning in your life surely you will try to use creativity to find out how can I make my life meaningful.

So, I keep doing this slide because it just helps you understand that creativity is not just about generating ideas, it is about moving from problem to solution.

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What is a Problem?

- How does a problem look?
- How does it feel?
- What are the different types of problems?
- Why are some problems easy and some difficult?
- How do we normally solve problems? In our lives?
- When are you happy solving a problem?
- What problems bore you? Irritate you? Upset you?



What is the problem? How does the problem look? These are only questions, okay, I am not going to talk. I just want you to get interested in creativity. After this lecture, I want you to go and google problems. How does a problem look? Does it have a feature? Most of the time, we do not even bother about these questions. I have put these questions down just to help you understand the depth of what we are doing, the depth of what we are trying to solve.

How does it feel? How does a problem feel? Does it feel good? Does it feel bad? How does it feel? What are the different types of problems? Big problems, small problems, everyday problems? What are the different types of problems? Why are some problems easy and some problems difficult? I am sure every one of us will know. In exams, some problems are so easy, some problems are difficult.

Life problems, I teach a subject called life skills at IIT, Madras. Life problems can be very difficult to solve. We can get overwhelmed by it. But somehow, we cope, we use our creativity to cope. And what is a big problem for me, maybe a small problem for you, and vice versa. So therefore, it is a beautiful question, why are some problems easy? The same problem, you have a problem when you are 20 years old. It seems to be a difficult problem, but when you are 40 years old it is easy problem. Why?

Because you have experienced it, you know how to solve it. How do we normally solve problems? Sometimes you just say, Oh I got the idea and I solved it. When are you happy solving a problem? I do not know whether you are happy solving the United Nations Sustainable Development Goals problems, but I am very happy. I was very happy when I solved one or two of those problems.

I am very happy when I am teaching, when I am solving the problem of teaching biomimicry. This NPTEL has been a big experience for us. We have to really use our creativity to put the information across to you. What problems bore you? Not all problems are happy problems. Some problems bore us, irritate us, why does it happen? Why do some problems irritate us? Why do some problems upset us?

(Refer Slide Time: 28:36)

How do you look for a problem?

- EMPATHY – easiest way to look for problems
- Empathy is putting yourself in the shoes of the other person and looking at it from their point of view.



How do you look for a problem? Empathy, my favourite topic, is the easiest way to look for problems. What is empathy, anyone? Empathy is putting yourself in the shoes of the other person and looking at it from their point of view. So, when you are doing problems, why am I talking about empathy here? Because from now on, once you learn empathy, and you have biomimicry as a tool, you can start to solve the problems.

But it is not only the UN SDGs that you can pick up problems from, you got lots and lots of problems in your life. So empathy is putting yourself in someone's shoes. For instance, at IIT Madras, we just started our creativity course and we are doing what is called an empathy walk. And empathy walk is where students put on their empathy hats and walk around the campus looking for problems.

For instance, one student may go to the hospital in IIT Madras and empathize or put himself in the shoes of the person waiting in the queue to see a doctor. When you say empathize, when you put yourself in the shoes, you become that person waiting outside to see the doctor, you become that person, you are that person. So therefore, you have a stomach ache and you just do not know what to do.

It is about half an hour since you have stood in the line, one hour you stood in line and the line does not seem to be moving, but your stomach is really aching, can you become that person. Once you become that person, once you say this is the problem that this person has, you will start to look for solutions. So, empathy is looking for problems, putting yourself in

the shoes of someone, and looking at the world from their point of view so that you are able to look for problems.

The difficulty in empathy, difficulty in empathy is not putting yourself in someone's shoes, but taking off your own shoes. I remember one of the students put himself in the shoes of the watchman and he found that a watchman has to stand from 9 o'clock in the morning to 5 o'clock in the evening in the hot sun and his knees start to ache, but he cannot sit down. So, the problem was how do, I relieve the knee pain of the watchman without having to make him sit down on a chair because watchman cannot sit down.

Then he thought of a lovely idea, a tripod stand-like seat where the watchman could rest his knees, just sits down for about 10 minutes, it is not really sitting down but he is resting his back on the tripod stand. Now after some time, he gets up and move. So every 1 hour, he just sits for about 10 minutes, he just rest his body for about 10 minutes and then he comes back. How did the solution happen?

Because this student became the watchman for some time, he stopped being a student and started becoming the watchman to understand the problem from the watchman's point of view. You know, next time I meet you, I will share some of the problems that the students have identified from inside the campus. But why them? You can start doing it yourself. You can start empathizing with your parents and looking at the world from their point of view.

So empathize with your mother who has to probably get up very early in the morning to make food for all of you. And then she has to pack food and she has to make people happy. She has got problems the entire day. If you can empathize with your mother, become your mother for some time, write down five problems your mother has and show the problems to her and say, are these not the problems you have? She will love you. And then help her try and solve those problems.

So, empathy is a brilliant tool to identify problems. This is one beautiful video that you can see. It is about Arunachalam Murugantham, many of you may have heard of as the pad man of India, I do not want to spoil the fun. But when you are watching the video, look for empathy in the video, look how he uses empathy and creates an entire business out of that empathy and a business that is so socially relevant.

It is a brilliant video for you to start looking at empathy, for starting to understand empathy and empathy can be a great tool for looking for problems. By the way, empathy is the first step in design thinking because design thinking is about empathy. Design thinking is also called human-centred design. So, therefore, you start with the humans at the center, you empathize with them, so design thinking the process.

Remember the process, design thinking processes; empathize, define, ideate, prototype, and test. Maybe I will come back later and explain it you in a more descriptive way, but design thinking start with empathy. So, coming back to the creativity journey, you start with a problem, you use the tools and you go to the solution. So that is creativity for you.

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What is a Solution?

- A solution is the way to solve a problem.
- A solution brings closure.
- Most solutions do not involve too much effort.
- Solutions are normally copied from others or made from experience.
- Some solutions may require extra creative effort.
- Therefore creativity becomes a choice.

We have forgotten solution, no, we have not forgotten. So what is the solution now? Most of you are almost there in the solution because today is the 7th week. You are probably already thinking about a solution. A solution is the way to solve a problem, a very simplistic definition. A solution brings closure, you say, you know what I have now come to a solution. So without solution, your mind is constantly wondering what could be the solution and all that.

Most solutions do not involve too much effort, what does it mean? It means that it is not very difficult to solve a problem. As long as you follow the process, like the biomimicry process it is not too difficult. Many of us shy away from problems because you think it is very difficult.

But look at the easy way it is, you just need a problem to solve. In this case UN SDG, you go through the steps and you get the solution. It is almost automatic.

Solutions are normally copied from others or made from experience. Many times, we look to others for experience, for instance coaching, coaching we look to ourselves to solve our own problems because we use our own experience to solve our problems. Some solutions may require extra creative effort; you know there are some out-of-the-box solutions you can try. You know what, remember I told you my children's example, I got four ideas.

So you may want to try about some more ideas, you may want to use some tools for generating new ideas, etc., which may require some extra creative effort. And therefore creativity becomes a choice. So, creativity, therefore, is the choice. How did we start? We said that every one of us can be creative. Now when I say every one of us can be creative, is there a choice or not? And you will find that many people do not want to be creative because they choose not to.

I always maintained that the beginning of creativity is the intention to be creative. Most of you or all of you are in this program because you intend to learn a new tool, you intend to learn a new way of solving problems. And you have picked up a United Nations Sustainable Development Goal because you not only have the belief that you can solve it, but you also have the intention to solve that problem. And what we are offering to you with this course is simply a tool to help you go from problem to solution.