Introduction to Biomimicry
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Lecture – 39
The Journey So Far

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So, we are now at the end of this course. I think in the last 8 weeks, there has been a lot of material that we have covered. In week 1, we mentioned that this course is about getting you started in your journey as a biomimic and that is what this course is all about. So as part of this, we started with what is biomimicry. Biomimicry is a practice that learns from and imitates the designs and strategies of nature in order to solve human challenges.

So, what you are doing is not learning about nature, you are not learning facts about nature. What you are doing is you are learning from nature. How does nature do something and you are taking that and imitating that, so that is biomimicry. Also looked at what is not biomimicry. Now, there are several bioinspired technologies in this world, and each of them does different things, but bio like you have biophilia, biomorphism, and bioutilization.

Biomimicry is different because it focuses on the function of what something does and that is what makes biomimicry different from other bioinspired methodologies. Also, why is biomimicry important? I do not think we need to talk about it at all, all of you are in this course

because you think that biomimicry is important. It leads to more so stainable solutions. It gives you a way to design new products and services or redesign products and services.

Also, you know it is high time, the state of the world right now without biomimicry we are going to really suffer, so, therefore, biomimicry is really important. What are we mimicking in biomimicry? Form, process, and system, thus it will be easy for you if you just kind of embed those examples in your head. Imitating form is the Kingfisher and the bullet train which was making a lot of sounds and then they imitated the Kingfisher's beak shape in order to make less sound.

Then the process is the termite mound which was used as the inspiration for the Eastgate centre in Harare, Zimbabwe to use less energy and less air conditioning in the building. And then imitating system is the Kalundborg industrial ecosystem in Kalundborg, Denmark where the waste from one industry is actually the raw material for another industry. So that is what we are mimicking in biomimicry. Then there are two approaches to biomimicry from nature to solution and from problem to solution.

So from nature to the solution you already have, you observe nature and look at some strategy or design that nature does and you then look at where could I use it to solve a problem. An example of this, of course, was whale power where the scientists observed the whales and the tubercles on the whales and then said can I use this somewhere and they came up with the idea of wind turbines enhanced due to tubercle-like structures.

Then you have from problem to solution where you start with the problem, you are looking at how do you solve the problem and say can nature help me solve this problem and you start exploring nature to do that. And the classic example of this is of course the Kingfisher and the bullet train, which you have already seen. So, the problem of noise was there. The engineers were wondering how to solve it.

They looked at nature, Kingfisher does not make a splash when it dives from one medium to another, can this be used and they were able to solve the problem. Then we looked at function, which is the most important concept in biomimicry because it underpins all the learning in biomimicry. Function, of course, is what something does, what the outcome of something is

and in the context of nature it is what an organism does to survive and that is what we look at when we imitate in biomimicry.

And function is what it does, strategy is how it does it. And strategy becomes important along with the context because how it does it and where it does it along with the other factors that influence how does it become important to understand what you can imitate and how you can imitate it. So this function, strategy and contexts are a key learning in order to be a biomimic. Of course, we looked at the biomimicry spiral, I guess this has been a large part of our learning.

It is the process through which you can apply biomimicry to solve a problem. So, you start with defining the problem. It is not just enough to say hey I have this problem and jump to a solution, you look at the problem, you try and understand it as much as you can, you find out what exactly you want to solve as part of the problem and then you articulate a define question or a design question which is in the form of how might we do something.

Then you have the biologize where you convert that define question to a biologize question. So, the define question is focused on the function that you want to accomplish in the human world, the biologize question is focused on the function that is translated to nature. So, you instead of saying how might we do something, you say how does nature do the same thing, but it is in a biological context.

Once you biologize it, you look at the function in nature and say which are the organisms that perform the same function and how do they perform it? What is the biological strategy that they use in order to perform that function? So, you discover a bunch of organisms how do they do it? Where do they do it? Then you abstract those design strategies from the biological strategies of those organisms. Abstract is going from a specific strategy to a general way of accomplishing something, you abstract those design strategies.

And then you come to the ideation part which is the emulate part. So, you take all your design strategies, consolidate them, find out how you can create ideas out of that in order to of course solve your define question, in order to solve the problem that you started with that is important because many times in the creativity process, we lose focus and start designing just because it looks cool or because we are more interested in it.

So, the emulate has to be connected to the define saying okay this is what I set out to solve, can I use the design strategies in order to solve using the principles of nature? And then you evaluate your solution, you evaluate what you have done and find out what is the technological feasibility, what is the business feasibility, etc., of that in the social context, in the environmental context, you start evaluating the solution.

And remember, this is an iterative process, it is not as if you will just go through it once and come up with solution. You may have to go through it multiple times, you may have to go back and forth between steps that is the biomimicry spiral. And as part of the biomimicry spiral, you also use nature's design principles or the unifying patterns, these are the important lessons you learn from nature as far as design is concerned like nature uses freely available energy.

Nature builds using only abundant resources. It does not use rare resources or uses rare resources sparingly. Nature uses safe chemistry which is conducive to life. Nature is locally attuned and responsive. Nature uses shape for function. All of these are design principles that you can incorporate in your solution. Again, this is not just in biomimicry, you can also bring these into your personal and professional life to see how you can imbibe the lessons from nature.

Of course, in order to come up with a problem that you want to solve if you do not have a readymade problem, you can use the United Nations Sustainable Development Goals. There are 17 goals very important to the world and 17 goals tackled different aspects of human life. And you can look at these goals, you can look at the targets and indicators in these goals and find out which of these are important to you, which of these resonate with you, pick up one and actually go about solving it.

The other critical learning for biomimic is to understand that everything is connected, to understand the system's view of the world. Problems, solutions, cause, effect, design; all of these are actually connected to each other. We saw these consequences. We saw the example of unintended consequences that happen because of the cats that were taken to Borneo, you saw that example. You saw the example of the big picture. You saw the example of interconnections of how wolves are influencing rivers.

So understanding interconnections, understanding it in a systems view is extremely important as a biomimic because otherwise we will just be repeating the mistakes that have already happened in the past and our solutions will be none the better for it. So therefore, we have to look at nature's design principles and systems view in order to design better, more sustainable solutions.

We of course looked at aspects of creativity because creativity is a vast topic, we did not cover it fully, but aspects of creativity we looked at. Intersections, curiosity, imagination, looked at aspects of creativity here. And we concluded with how do you take a biomimicry idea to market. What are the ways in which you can actually take an idea to market and the tool is the biomimicry business model canvas.

So that is what we have covered so far in the 8 weeks. And remember this is to get you started on your journey. Also, this will not work if you do not practice it. This course is not about just watching all the videos and doing all the assignments and saying I am a biomimic, I have a certificate, it is about actually practicing what you have learned. It is about picking up a problem from the UN Sustainable Development Goals, applying the biomimicry design spiral.

Finding out how you can use the design principles in order to create a solution, taking the systems view, using the concepts learned in this course, and actually coming up with a solution and finding out if you can take that idea to market. So, this is something we hope we are able to emphasize to you that this is what the course is. It is about being a practitioner and not just about learning a whole bunch of theory.

And we really hope you had a good time learning in this course, you had something that you have learned in order to change the way you are thinking about how to solve problems. We look forward to hearing from each of you how you have solved your problem, how you plan to take it to market, and we really look forward to seeing you in biomimicry 2.0 as well. Thank you.