

IME-100

Interdisciplinary Design and Manufacturing

Introduction to Innovation and
Entrepreneurship

Dr. Girma Tewelde

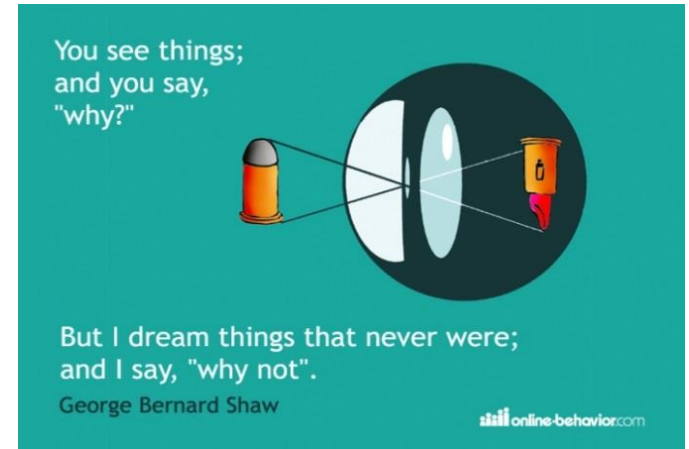
Topics

- * Creativity, Innovation, and Entrepreneurship
- * What is problem solving?
- * Entrepreneurship Mindset
 - Examples
 - Exercise
- * Additional resources

Creativity, Innovation, and Entrepreneurship

Creativity

- * Creativity is seeing what everyone else has seen, and thinking what no one else has thought – Einstein
- * Creativity is the capability or act of conceiving something original or unusual - Paul Slone
- Tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others – Robert E. Franken



Creativity, Innovation, and Entrepreneurship

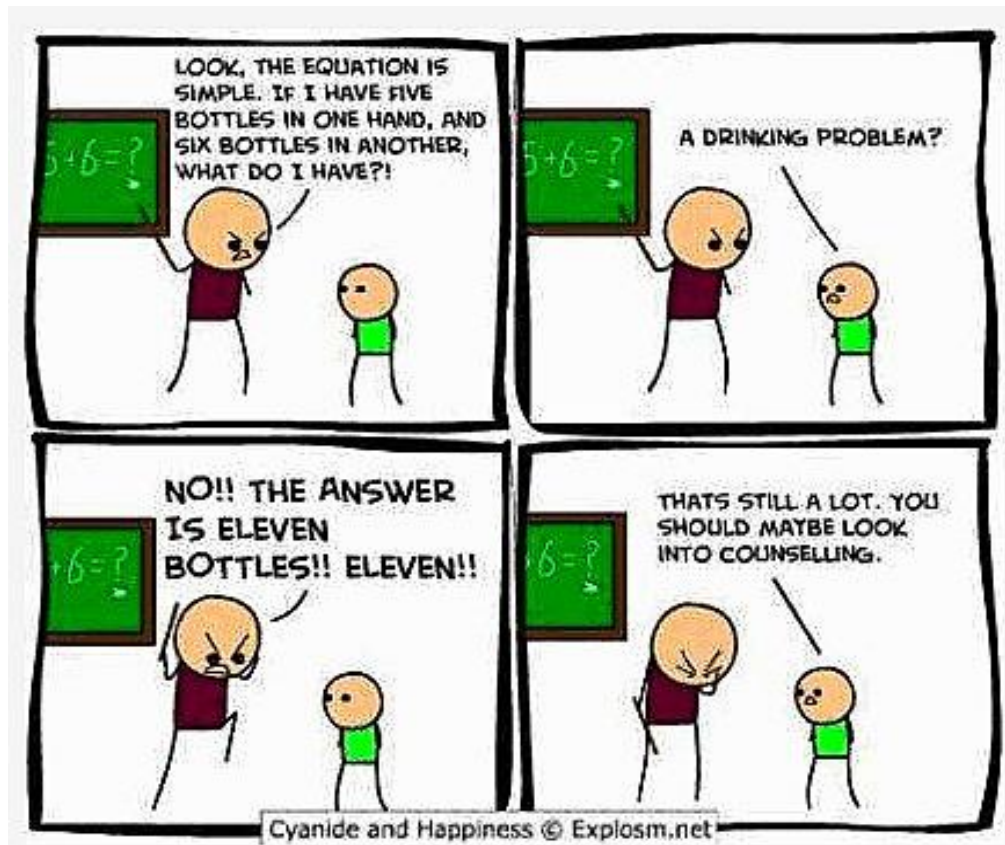
Innovation

- * The process of translating an idea or invention into a good or service that creates value - Business Dictionary
- * Creativity is thinking up new things. Innovation is doing new things - Theodore Levitt

Entrepreneurship

- * Capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit - Business Dictionary
 - Or has societal impact – Social Entrepreneurship

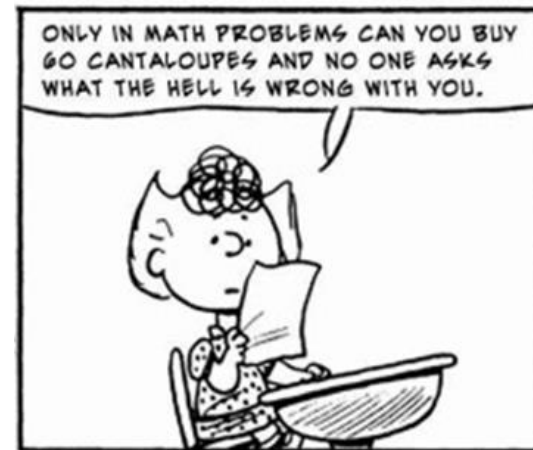
What is Problem Solving?



Creative Problem Solving

- * **Creative Problem Solving** - proven method for approaching a problem or a challenge in an imaginative and innovative way. It's a tool that helps people re-define the problems they face, come up with breakthrough ideas and then take action on these new ideas.

http://www.math-problem-solving.com/funny_math_cartoons.html



<http://www.creativeeducationfoundation.org/our-process/what-is-cps>

Creative Problem Solving Steps

1) Explore the Challenge

a) Objective Finding – *Identify Goal, Wish or Challenge*

b) Fact Finding – *Gather Data*

i) Assess and review all the data that pertains to the situation at hand.

ii) Who's involved, what's involved, when, where, and why it's important.

iii) In this step, all the data is taken into consideration to review the objective and begin to innovate.

c) Problem Finding – *Clarify the Problem*

i) Explore the facts and data to find all the problems and challenges inherent in the situation, and all the opportunities they represent

ii) This is about making sure you're focusing on the right problem. It is possible to come up with the right answer to the wrong problem.

2) Generate Ideas

a) Idea Finding – explore ideas that are possible solutions

Creative Problem Solving Steps

3) Prepare for Action

a) Solution Finding – Select and Strengthen Solutions

- i) Strengthen and improve the best ideas generated.
- ii) Generate the criteria that needs to be considered to evaluate the ideas for success.
- iii) Apply the criteria for the top ideas and decide which are most likely to solve the redefined problem.
- iv) The best idea needs to meet criteria that makes it actionable before it becomes the solution.
- v) A creative idea is not really useful if it won't be implemented.

b) Acceptance Finding – Plan for Action

- i) Look at who's responsible, what has to be done, and what resources are available in order to realize this idea as a full-fledged, activated solution.

Brainstorming

- * <http://www.creativeeducationfoundation.org/our-process/brainstorming>
- * A creative conference for the sole purpose of producing a ***checklist of ideas*** – ideas which can serve as leads to problem solution – ideas which can subsequently be evaluated and further processed. – Alex Osborn
- * The Dynamic Balance of Creativity
 - a) Divergent thinking – generate lots of options
 - b) Convergent thinking – judging options, making decisions

Brainstorming

Convergent vs. Divergent thinking:

- * We do both kinds of thinking on a daily basis. The secret to creating new ideas is to separate your divergent thinking from your convergent thinking. This means **generating lots and lots of options before you consider judging them.**

Divergent thinking guidelines:



Convergent thinking guidelines:



Painstorming and Suboptimal Equilibrium

Source: Painstorming & Suboptimal Equilibrium, By: Jonathan Weaver, UMD; and Sri Condoor, SLU

- * What trigger words come to mind when you think about pains with existing products or in life?
 - * problems, glitches, complications, irritations, frustrations, bugs, faults, troubles, worries, fears, concerns, anxieties, impediments, ...
- * Painstorming is identifying your customer's pains
- * Suboptimal equilibrium refers to a situation wherein the customer experiences a pain or inconvenience) with the product/service, and continues to engage in its use.

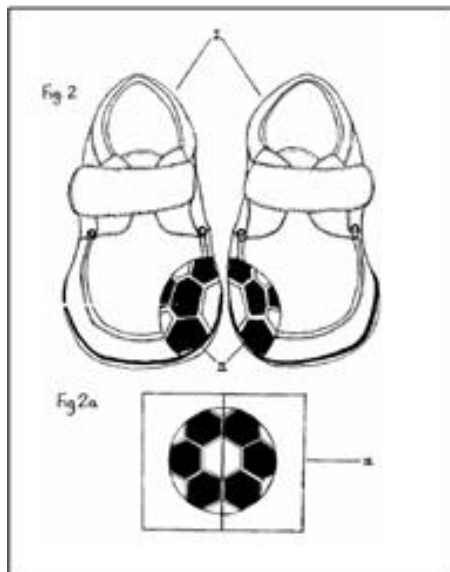
Painstorming and Suboptimal Equilibrium

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- * The customer may or may not be conscious about the existence of the pain.
- * The customer may view the situation as an acceptable inconvenience or a part of getting the job done.
- * An entrepreneur sees an opportunity of moving the equilibrium to a *higher value proposition* by addressing the pain.

Painstorming ... Innovative Solutions

What's the toughest part of putting on shoes for a 2 year old?



Painstorming ... Innovative Solutions

- * **Traveling through airports with young children can be a pain!**



<http://www.gizmag.com/airport-ride-on-carry-on-chair/14085/>

Entrepreneurial Mindset

KEEN – Kern Entrepreneurship Education Network

<http://www.keennetwork.org/>

* Instilling Entrepreneurial Mindset in Engineering Undergraduates

<http://www.youtube.com/watch?v=PFoKmWfkDcU&feature=youtu.be>

* **The entrepreneurial mindset includes critical thinking, problem solving, teamwork, customer awareness, business skills, persistence, and societal values.**

* Engineering Skills from Opportunity to Business

<http://www.keennetwork.org/images/Opportunity-11.25.pdf>

Attacking Big Problems

- * National Academy of Engineering – Grand Challenges for Engineering
<http://www.engineeringchallenges.org/cms/challenges.aspx>
- * Examples – Innovative solutions for addressing electricity shortage in developing countries
 - Soccer ball generates electricity
<http://www.youtube.com/watch?v=oeb2fyHKirQ>
http://sciencereview.berkeley.edu/3pieces_of_entrepreneurship/
<http://www.unchartedplay.com/>

Exercise – Applying Painstorming

- * **Individual task:** Spend a few minutes to think about one or two things in your daily life or routine that bothers you or that is inconvenient or that you think is not working well
- * **Group task:** In group of 2 or 3 students discuss the bothersome, inconvenient, or troublesome things that each individual student identified, choose one of them for a group activity and continue your brainstorming activity to answer the following questions:
 - What is the cause of the pain
 - Whether the pain can be generalized to apply to most people
 - Are there existing solutions that deal with the pain
 - Can you come up with potential ideas to deal with them

Additional Resources

a) Kettering Entrepreneur Society

<http://www.kesociety.com/>

- * Location – 5th Floor Campus Center
- * Activities
- * Innovation challenge
- * Kettering Impact

b) Michigan Collegiate Innovation Prize (MCIP)

<http://www.mciprize.com/>

c) Accelerate Michigan Innovation Competition

<http://www.acceleratemichigan.org/>