Entrepreneurship in Engineering Education
Ideation - Action - Education

USTM – Morocco - 2013
Sportsman → Sportsmanship
Citizen → Citizenship
Leader → Leadership
Designer → Designership
Entrepreneur → Entrepreneurship
Entrepreneurship

Seeing

Imagining

Action

Ideation
If technology enterprise arises from ideation and action, then engineering education should support their development.
How has education supported ideation development (creativity)?

“Why is there so little apparent correlation between education and creative productiveness?”

J. P. Guilford
Presidential address to the American Psychological Association (APA)
1950
“Ordinary” Creativity
Alex Osborn
(1942, 1949, 1952, 1953)


Scientific literature from this time period: Creativity = “Great Man”; “Trait”
Creative process of “Great Men”
Lack of creativity = f(Motivation)
Provide incentives and receive less creativity

McGregor - 1966
The Human side of Enterprise

Kruglanski & Chand - 1971
The effects of extrinsic incentive on some qualitative aspects of task performance

Deci - 1972
The effects of Contingent and Noncontingent Rewards and Controls on Intrinsic Motivation

Amabile - 1998
How to Kill Creativity (HBR)
Intrinsic Motivation

Problem Finding

Ideation

Evaluation

Solution

Awareness
(Open to experience)

Knowledge

Procedural
(“Know-How”, Skills, Strategy)

Material
(Theory, First Principles, Facts)

A Creative Process

[Extrinsic- Basic Needs]

Intrinsic

Based upon: Cognition and Creativity (1995), Runco, M.A., I. Chand, Educational Psychology Review, 7, 243-267
Innovative Enterprise Development
Engineering Entrepreneurship

Action

Action = f(Personality)
(e.g. The Achieving Society, McClelland, 1961)

Action = f(Education)
(e.g. 21st Century entrepreneurship education programs)
"There is *no correlation* between entrepreneurship education and the intention or desire to start a business."

Impact of Entrepreneurship Education in Denmark - 2011

2000 students born in 1996

(Page 27)
“Entrepreneurship Teaching Programmes (ETP) could have some strong positive influences for some students depending on their background and initial perspectives on entrepreneurial intention.”

“At the same time, the ETP could also actually decrease the level of entrepreneurial intention (counter effects) for other students who have been yet exposed to entrepreneurship.”

How does education correlate with action (i.e. intention to start business)?
Entrepreneurship Intention Model (EIM)

Based upon: Shapero (1982), Krueger (1993)
How can education support self efficacy and motivation?
Self Efficacy (Bandura, 1977)

Demystifying the entrepreneurial process, building self-belief.
Students work on company-based projects and learn by working.
Authenticity is a dominant predictor of self-efficacy.
Pedagogy for creativity, innovation and venture creation.
Self Efficacy (Bandura, 1977)

Demystify

Authenticity

build self-belief

learn by working

creativity, innovation and venture creation.
Men are tied to limited jobs which do not utilize their capabilities
Responsibility is discouraged
Passivity is encouraged
Meaning has been eliminated from work
Change will be slow
Change requires modification of management and workers alike
People are accustomed to being directed, manipulated, controlled
People find satisfaction away from the job
This is true of management and workers
(Based upon McGregor, 1966)

**Enterprise Education - Motivation**

**Students** are tied to limited **studies** which do not utilize their capabilities

Responsibility is discouraged

Passivity is encouraged

Meaning has been eliminated from **learning**

Change will be slow

Change requires modification of **Professors** and **students**

**Students** are accustomed to being directed, manipulated, controlled

**Students** and **Professors** find satisfaction away from the classroom
(Based upon McGregor, 1966)

**Enterprise Education - Motivation**

Allow students greater freedom with studies to better utilize their capabilities

Encourage (demand) responsibility

Discourage (forbid) passivity

Inject meaning in learning

Be patient

Professors and students should be partners in change

Students should not require direction, manipulation, and control

Students and Professors should find satisfaction in the classroom
Innovative engineering enterprise development (i.e. engineering entrepreneurship) can be supported by education.
But that education must be meaningful and substantive, leverage intrinsic motivation, and build confidence

Questions?