The Anatomy of an Educational Innovation: Using Life Stories to Promote Learning in Engineering

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The **Anatomy** of an Educational Innovation: Using Life Stories to Promote Learning in Engineering

A study of the structure or *internal workings* of something.

Anatomical landmarks are reference points to help us talk about, learn about, promote, educational innovation.
The Anatomy of an Educational Innovation: Using Life Stories to Promote Learning in Engineering

Novelty is the first of two characteristics that differentiate innovation from creativity.

A second valuable concept that distinguishes innovation from creativity is implementation.

We need our innovation to be implemented by others to have a meaningful impact on engineering education.

After this session I hope you will:

- Remember the kinds of “anatomical landmarks” that are needed to support educational innovation
- See the link between the learning sciences and design thinking in educational innovation
- Be intrigued by the power of stories to drive learning (i.e., story-driven learning)
Educational innovation begins with an authentic need of our students

• Recall a student who struggled or faced a challenge

• Visualize them in your mind’s eye

• Think of 2 “sticky details” that describe them
Share a brief story about this student

- Share with the person next to you
- Person with the longest hair shares first
- 2 minutes later – next person shares
Reasons we need to innovate include:

• A need to enhance engagement and learning
• Knowledge (and technology) is rapidly advancing
• Students’ career opportunities are vast and varied
• Global challenges are complex and growing
• Student wellbeing is in decline. We need to find ways to support a greater sense of belonging, connectedness and purpose
• We need more joy in engineering education
THE CRISIS OF CONNECTION

ROOTS, CONSEQUENCES, AND SOLUTIONS

EDITED BY Niobe Way, Alisha Ali, Carol Gilligan, and Pedro Noguera

The Good Life

LESSONS FROM THE WORLD'S LONGEST SCIENTIFIC STUDY OF HAPPINESS

CREATE A MORE MEANINGFUL AND SATISFYING LIFE

Robert Waldinger, MD and Marc Schulz, PhD
Implication 1: Let’s support the whole person

The 3 Domains of Competence:

• Cognitive:
  – thinking, reasoning, problem-solving, memory

• Interpersonal:
  – Express and interpret information to and from others

• Intrapersonal:
  – Emotions and feelings, including self-regulation

“Emerging evidence indicates that cognitive, intrapersonal, and interpersonal competencies can be taught and learned in ways that promote transfer”

Implication 2: We need a change system

Every system is perfectly designed to get the results it gets.

We need to create a system of educational innovation that can sustainably and nimbly produce these kinds of changes to the learning environment.

Today’s focus: an example innovation and its change system.
My educational innovation experiences

- **Problem-based learning (PBL)**
  - Initial team size: Individual
  - Start Date: 2005

- **The problem-solving studio (PSS)**
  - Transforming engineering education for inclusion
  - Department: 2017
  - Institute / National: 2018

- **Life stories and the entrepreneurial mindset**
  - Initial team size: National
  - Start Date: 2018

- **SuperCourses: The Future of Teaching and Learning**
  - Ken Bain
The educational innovation journey... begins with our students’ needs

Honors & awards

Best Overall Interdisciplinary Design
Issued by 2016 Georgia Tech Capstone Expo · Apr 2016
- Designed a more appealing intrauterine device (IUD) in order to increase IUD usage and, thereby, minimize contraceptive failure due to user error and decrease the perc

Best Undergraduate Poster
Issued by 2016 Materials Science and Engineering Poster Competition · Apr 2016

Faculty Honors (4.0 GPA) Spring 2015
Issued by Georgia Tech · May 2015

About

Hello world! I'm in love with learning - this is me at my core. I love to learn by building and breaking things. I seek to understand my surroundings, how things came to be, and how they can be improved. I am inspired by the unknown - the vastness and possibilities of the universe, and the intricacies of even the seemingly mundane.
The innovation journey... benefits from the learning sciences
My colleagues and I collect people’s life stories in order to understand the different ways in which people in our society and in others live their lives and the different ways in which they understand who they are.

- Dan McAdams
The life story interview

• Life Chapters

• Key scenes in your life story
  – High point, Low point
  – Turning point
  – Childhood memories (+ and -)
  – Vivid adult memory
  – Wisdom event

• Future Script

• Life Theme
We are our life stories

• We provide our lives with unity and purpose by constructing internalized and evolving stories of self

• Starting in adolescence, we begin to make meaning of our autobiographical memories to understand who we are and where we are going

• Narrative identity is shaped by our environment, including via “joint reminiscences”
Story-driven learning can promote:

• Leadership and career skills
• Belonging and empathy
• Well-being
• Self concept clarity
  – Less anxiety
  – More resilient
  – Greater agency (and entrepreneurial mindset?)

To have impact, stories must transport us

• Transportive stories include the following:
  – Vivid imagery
  – Emotional resonance
  – Characters we care about in a high stakes situation
  – Meaningful (transformation of main character)

• Stories that are transportive have the potential to shape our self-concept, and therefore our well-being and future actions

We developed a new story-driven learning (SDL) experience

Janece Shaffer
http://storyready.com/
Learning Science vs Design

### Process

**Learning science**
- area of interest
- study
- area of interest

**Design**
- divergence
- transformation
- convergence

### Purpose

- **Learning science**
  - to determine the nature of what has been and what currently is

- **Design**
  - To create what ought to be in the future for the people you care about / are designing for

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“The Art of Telling Your Story”

Fall 2018
• (5) 3-hour sessions
• 16 students
• Sessions
  – Childhood story
  – Peak experience
  – Failure
  – Future perfect
  – About me

Spring 2023
• (15) 2-hour sessions
• 80 students, 4 sections
• Modules
  – Why Life Stories?
  – Who Am I?
  – Who Am I as a Leader?
  – Putting Stories to Work
  – About me

LSED eg #1: the course design was informed by the life story interview
The “ingredients” of a powerful story:

*LSED eg #2: story telling tips informed by transportation theory*

- “Land the plane” in a specific moment of time
- Sticky details: help us see it and remember it
- See it, see it, **feel** it: what were you feeling?
- Transformation of the character – make it clear
Phillip’s story: what’s your feedback?

Phillip Robinson

Land the plane
Sticky details
See it, see it, feel it
Clear transformation
The stories about me as a child show that while many parts of me have changed, my core ideals seem to remain, and it helps me identify what I value and what I should keep in mind as I choose my future path.
Innovations happen in “yes, and…” cultures
Do I have to be a playwright to do this?
This brings us to where we are now
We are helping others adopt SDL

At Georgia Tech:

• Create-X
  – If I don’t start my own company, did I learn anything?

• Civil and Environmental Engineering
  – Sense of belonging to the major and the field

• Aerospace Engineering
  – Telling the story of their learning
  – Connecting with faculty

At other universities:

StoryMakers:
A Quest to Engage, Connect, and Inspire
August 10 - 12, 2022 • Denver, Colorado

Engineering Unleashed
Powered by Keen
An “anatomical landmarks” checklist for your innovation journey

Ignite
- Look for student needs
- Create “incubator” courses or experiences

Create a “Yes, and...” Culture
- How treat new ideas?
- What happens when people “fail”?

Use “LSED”: L. Sci + Design
- Use learning sciences to inform your design
- Run prototypes, place little bets, learn by doing

Implement at Scale
- Apprentice / coach
- Help faculty adapt the innovation to their context
If I can stop one heart from breaking,
   I shall not live in vain.
If I can ease one life the aching,
   Or cool one pain,
Or help one fainting robin
   Unto his nest again,
   I shall not live in vain.

- Emily Dickinson