Rob Reilly

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- Doctor of Education
- Visiting Scientist, MIT Media Lab
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- Candidate for IEEE Board of Directors
WHAT IS: PEDAGOGY, EDUCATION, INTELLIGENCE, KNOWLEDGE, LEARNING, TEACHING, INFORMATION: WHY DO WE CARE?
Reilly’s Rule

Teacher’s can no longer just throw information, and facts at students and expect ‘education’ to occur!
What do you do when a student is:
• being bored
• getting frustrated
• doing cognitive assessment

How do you recognize a student that is:
• being bored
• getting frustrated
• doing cognitive assessment
Not an engineering project
Not calculating the coefficient of sliding friction!
These are models for human-use
...to motivate humans!
The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.

—Alvin Toffler
“ACQUIRE KNOWLEDGE…”

Over the past 10 years and over the previous century, we have seen mega change in, for example, transportation, medicine, and, communications!

What changes have there been in Education, in teaching pedagogy in the past 10 years, in previous centuries?
Function of education is independent from its delivery technology
‘CALL CENTER’ MODEL

“Any activity where we can digitize and decompose the value chain, [the decomposed activity] will get moved around the world.”

Thomas Friedman, *The World is Flat*
‘CALL CENTER’ MODEL

You can’t digitize (or outsource) a **haircut** or a **meal** at a restaurant.

You **can** digitize (and outsource) reservations, appointments, financial records, tax preparation
a Process
a Process – w/Call Centers

Much wider thinking

1 2 3 4

Digital outsource
a Process – w/Call Centers w/Digital Outsourcing
‘DIGITAL OUTSOURCING’ MODEL

Change the perception of what part(s) can't be digitized!

Don’t just review the best models for Education – look at the best models!

McDonald’s drive-up configuration
• 2 order rows – 1 pickup row
MY HYPOTHESIS

The impact of technology involves understanding how we deliver the fruits of knowledge to a student.

- Goal of Educational System: Deliver a functional adult to society.
  - How to construct one
Language of Rules vs. Language of Functions

- People not equipped to meaningfully understand STEM (theory & function)
  - Brain areas not developed, not exercised,
  - build automobiles w/out building an automobile factory
Language of Rules vs. Language of Functions

- **K-3 develop brain pathways & areas**
- Not trying to build geniuses – everyone!
- Need to accommodate increased ability of technology
Language of Rules vs. Language of Functions

What is the cost of doing this?

- cost – not primary issue
- care about knowing what the brain capability actually is!
  - linear vs. non-linear
  - *walk and chew gum* – multi taskers
Language of Rules vs. Language of Functions

- Stuck with Language of Rules
- Need the Language of Function
- Evolve the Language of Education
  - Apply it to a model
WHAT IS: PEDAGOGY, EDUCATION, INTELLIGENCE, KNOWLEDGE, LEARNING, TEACHING, INFORMATION: WHY DO WE CARE?
What is the **Language of Education**
We must understand the function-of and relationship-of:

- Intelligence
- Knowledge
- Wisdom
- Information
- Data
- Education
- Teaching/Learning
- Pedagogy

Disambiguate terms
WE MUST UNDERSTAND THE FUNCTION-OF AND RELATIONSHIP-OF:

- **Intelligence** → capability solve think
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**Knowledge Domains**

- **Rule-based** – **INFORMATION**
  - Learn the rule, you have the knowledge
  - Reading, learn to speak a language, driving test

- **Model-based** – **UNDERLYING PROCESS**
  - Recursion, deep learning, understand the model and be able to apply it
  - Sciences, engineering
RULES!

1. You SHALL!
2. You WILL!
3. You MUST!
Rule Based Domain – Juke Boxers

Jukeboxers:
• park every song separate slot
• compartmentalizers
• most people store information like a Juke Box stores records -- separate compartments.
• adjacent records have little or nothing to do with each other.
memorize facts

rigidly adhere to rules

don’t have unique solution
Rule-based Learning -- Information

Data → Q&A → Information → Integrate → Knowledge

Focus of modern day education

a set of facts
DANGER

NO RULES
MODEL BASED REASONING
**Model-Based Learning — Underlying Process**

Theories with underlying models

- **Values and disvalues**
- **Wisdom**
- **Knowledge**
  - **Insight**
  - **New focus of attention**
- **Anecdote**
  - **Collection**
  - **Integration**
- **Data**
  - **Q&A pairs**
- **Information**
- **Story making**

It’s a Loop!
What do you do when a student is:
• being bored
• getting frustrated
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How do you recognize a student that is:
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Emotion Axes

-1 -0.5 0 +0.5 +1

- anxiety  worry  discomfort  comfort  hopeful  confident
- ennui  boredom  indifference  interest  curiosity  fascination
- frustration  confusion  puzzlement  insightful  enlightened  euphoric
- dispirited  disillusioned  dissatisfied  wistful  hopeful  encouraged
- terror  dread  apprehension  calm  enchanted  enthralled  awe
- humiliation  embarrassed  chagrín  content  pleased  prideful
Emotions and Learning Cycle

Constructive Learning

- Negative Affect
  - confusion
  - disappointment
  - diagnose
  - frustration
  - dispiritedness
  - discard misconceptions

- Positive Affect
  - satisfaction
  - curiosity
  - investigate
  - hopefulness
  - determination
  - fresh research

Un-Learning
Life isn't about finding yourself.

Life is about creating yourself.
Use what you are!
GREAT LEADERS OR GREAT VISIONARIES

Prophet Mohamed (pbuh)
Apply INFORMATION → KNOWLEDGE → WISDOM

What if we could broadcast high voltage electricity the same way radio is broadcast?

• Bankrupt some countries?
• Social changes?
• New businesses will develop?
• Old businesses will disappear?
• What else would occur?
Every War Must End

Fred Charles Ikle

(1971, 1991)
Thank you

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