CEEA2018: UBC, Vancouver, Canada

unleashing knowledge creation and sharing in a

Reflective Open Education

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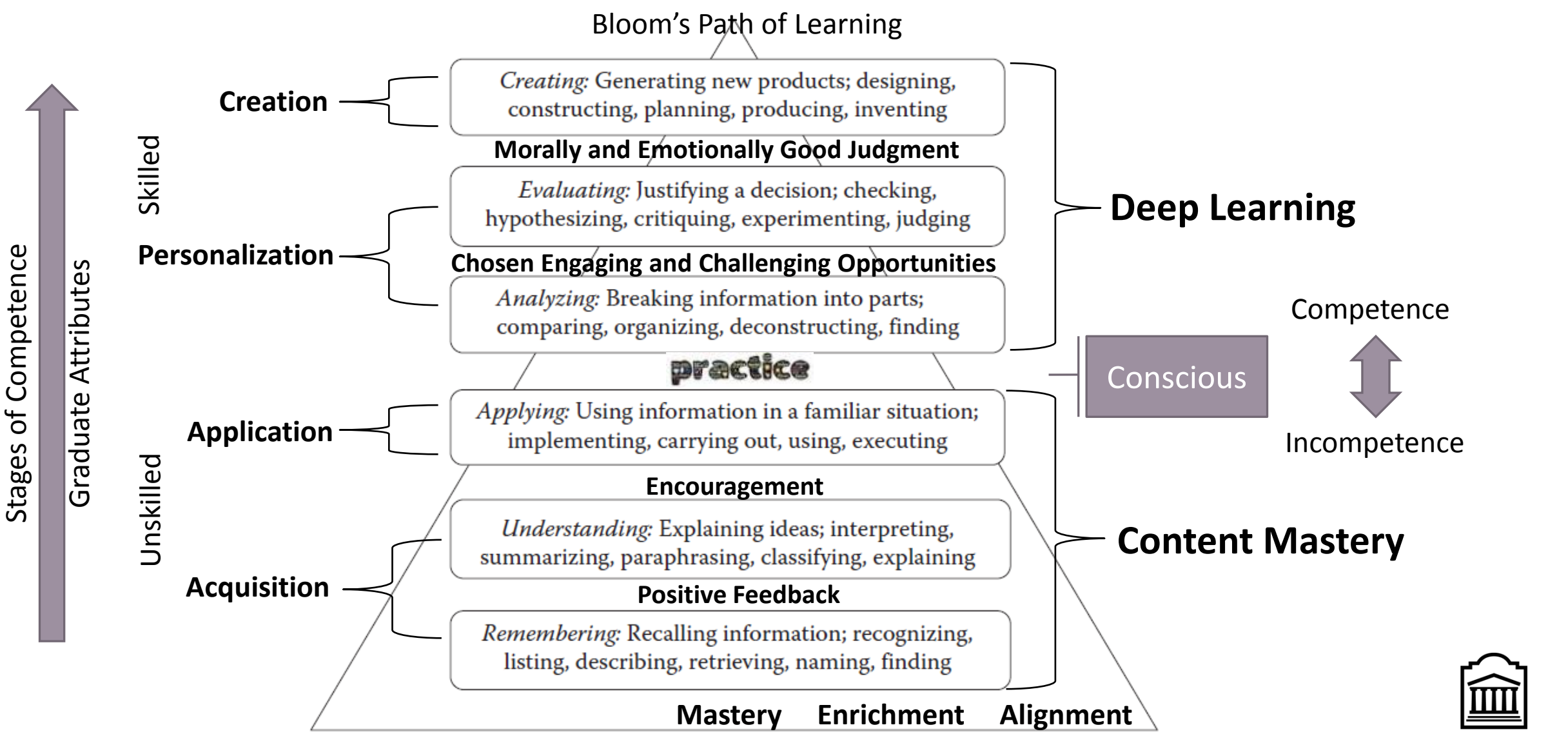
the message: toward positive engineering schools

knowledge content is a means to an end, not an end in itself.



Engineering is a creative social activity; it is about design under constraint.
Profession is work that requires sophisticated skills; the use of judgment; and the art of discretionary leadership.

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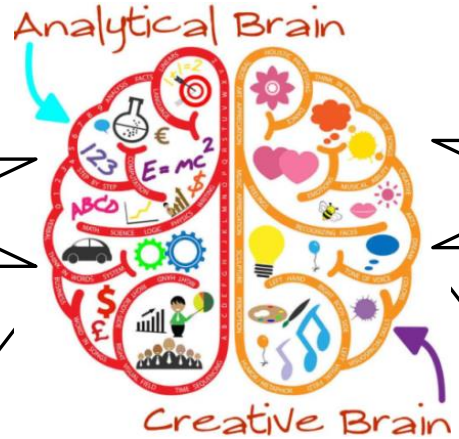
topics rather than **subjects**

what**, why,** how

problem solving

personalization



involve me i learn

(deep learning)

tell me i forget
teach me i may remember
(content mastery)

ancient Chinese proverb

whole system

choice

problem finding

studio

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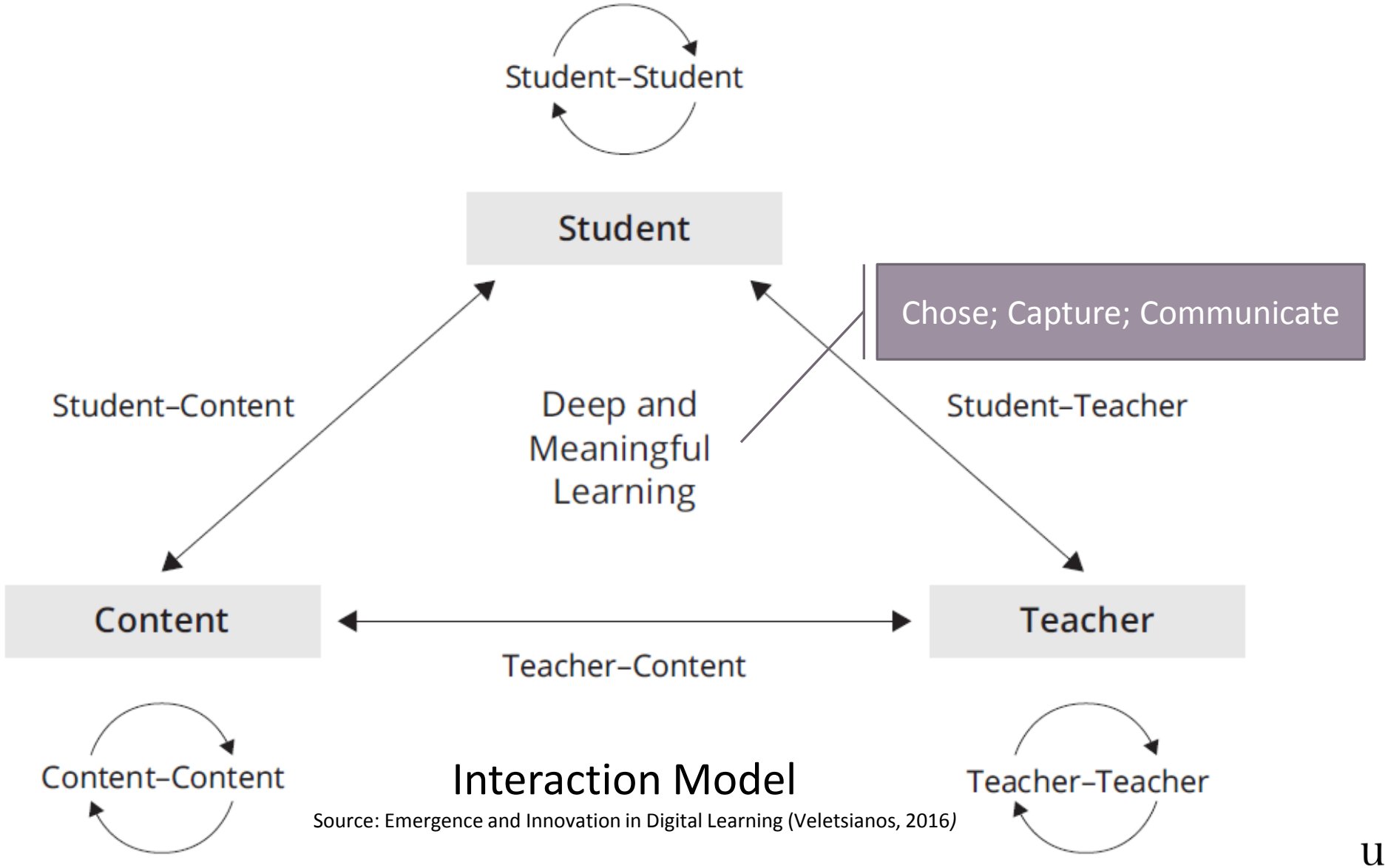
Think Feel Act



Interaction Model

Source: Emergence and Innovation in Digital Learning (Veletsianos, 2016*)*

Digital tools to support the language of reflection

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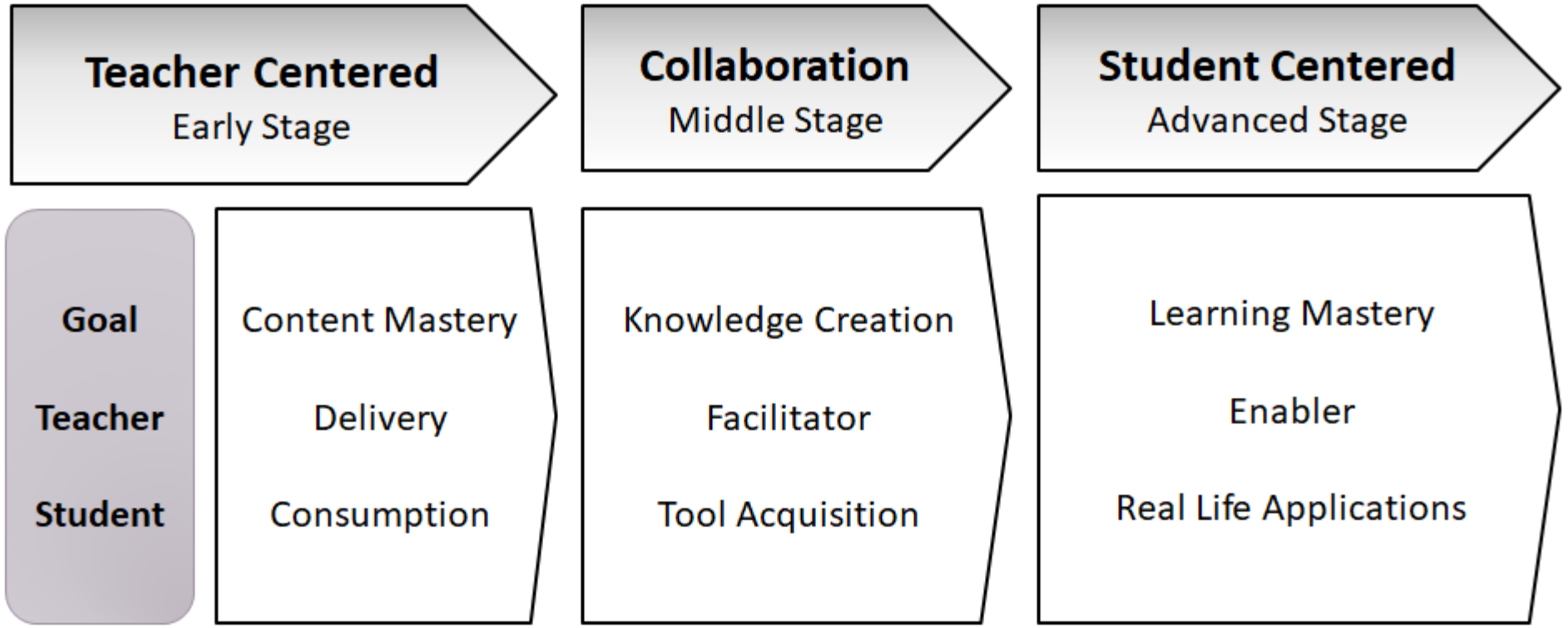
Toward state of flow experience



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The “bucket theory of knowledge”

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Course content should not be used as an **end** in itself, but as a **means** of helping students learn how to learn.

Teaching should shift from covering all required content to guiding principles of the learning process.

Grading should not be based on reciting back lecture notes. Sometimes, grading is very degrading for students.

Knowledge Creation

(High-level use of technology)

Analyze data; collaborate with peers and teachers; develop and use simulations, build products; create presentations.

Information Consumption

(Basic use of technology)

Practice skills and procedures; take test or turn in homework; find information in the Internet; write reports, etc.

Knowledge needed in engineering

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Core: Theoretical science- math-based knowledge.

Lifelong self-educate, to meet new problems: Design concepts; criteria and specifications; quantitative data; practical considerations; knowledge of tools and strategies in project management.

Societal skills: Knowledge of values, norms, and context.

3 Ps of Learning

personalization; participation; productivity

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Student learn in many ways, so the challenge for teachers is to discover which approaches help students learn most effectively.

Reflection as a personalized process of informal engagement enables learners to produce results by using real-world contexts, carrying out “whole” tasks, and solving problems as they arise.

Acquisition to participation to creation

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Personalized learning is to get away from the concept of “lesson” by designing topic- case- project-based forms of learning.

Gone are the days when people learned and worked in isolation. Media have transformed learning to collaborative environments.

Through applying learner-centred pedagogy, students gain insights by dealing with real-world questions and problems.

Sage on the Stage or Guide on the Side

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Studio learning

Team projects and the idea of CDIO

Open-ended problem solving

Learning-by-doing

Engagement in research

Targeting skills and competencies

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Critical and inventive thinking

Communication, collaboration and information retrieval skills

Problem finding, defining, and solving

Social and emotional competencies

Initiative and creativity basic skills in entrepreneurship

Project management and leadership skills

Writing, presentation, and speaking skills

Ethical , environmental, and sustainability awareness.

Case 1: Course subject content

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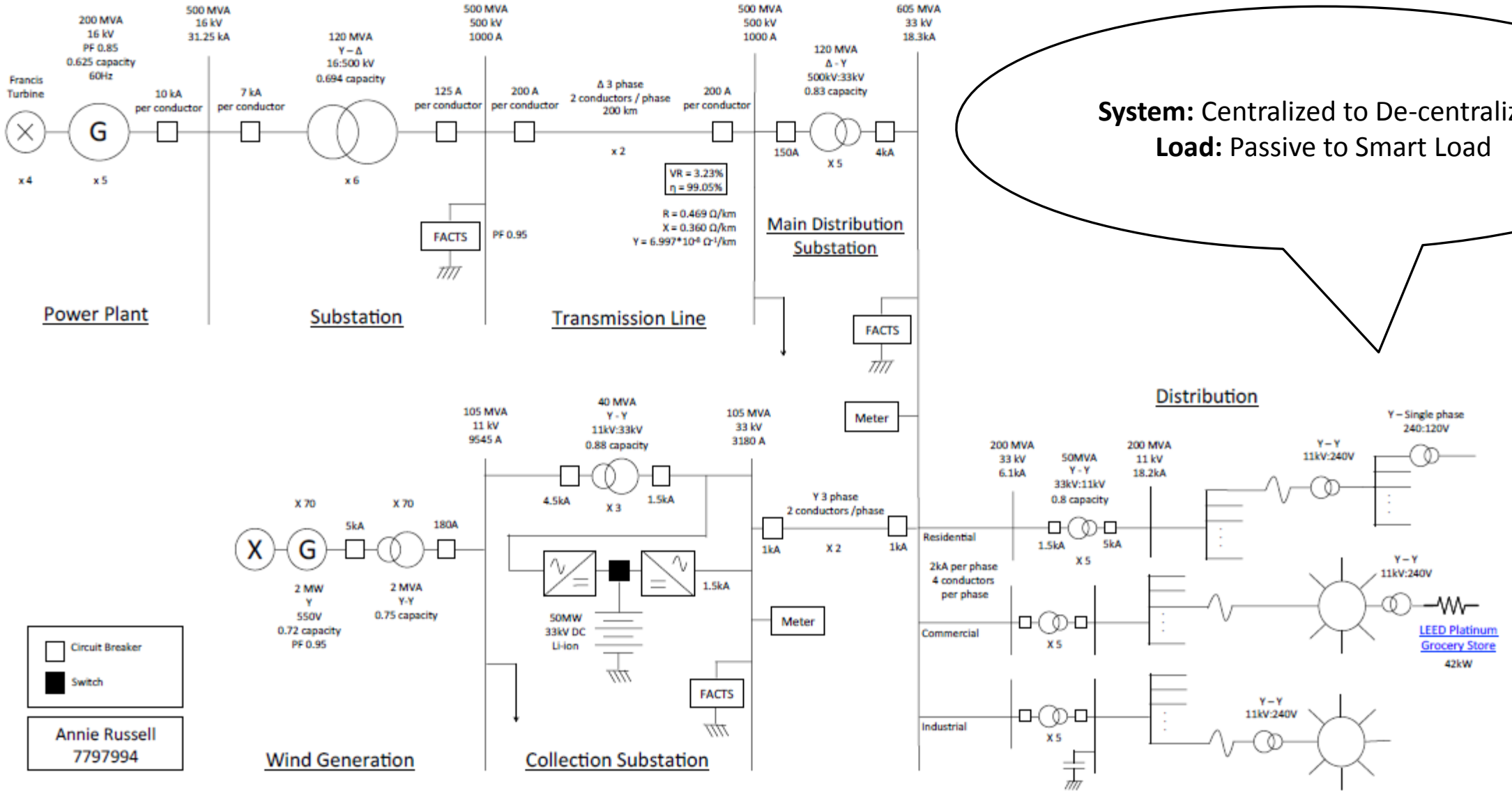
ELG4125: Electric Power Transmission, Distribution and Utilization
Textbook: Power System Analysis and Design
Components: Lectures; Tutorials; Labs

Course Content:
Transmission system
Protection system
Distribution system
Utility applications of power electronics



System: Centralized to De-centralized
Load: Passive to Smart Load

Design Case of a “Smarter Grid”

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LEED Platinum Grocery Store: Case Project Video

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Case 2: course subject content

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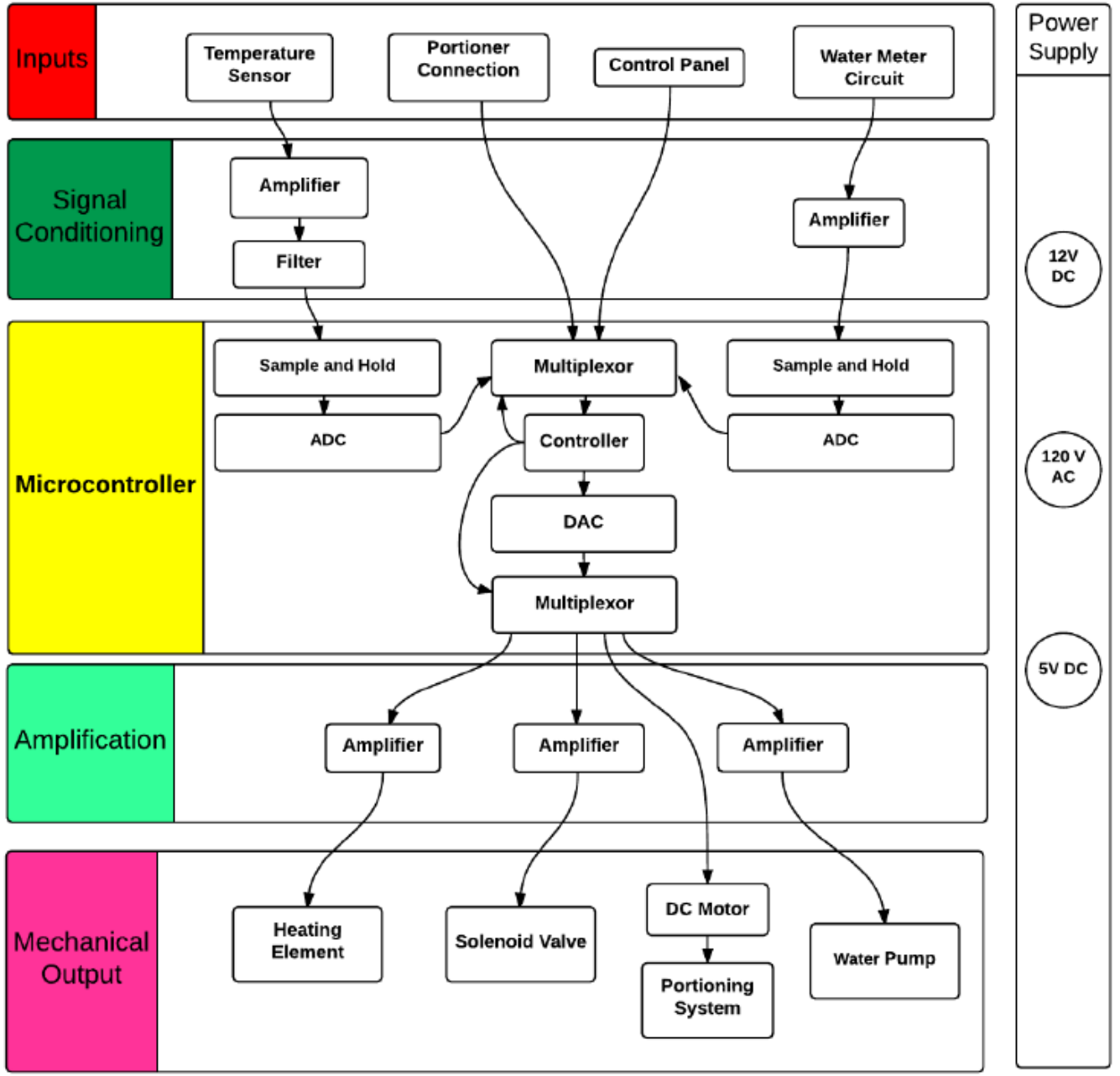
ELG3336: Electronics for Mechanical Engineering
Textbook: Principles and Applications of Electrical Engineering
Components: Lectures; Tutorials; Labs.

Course Content:
Operational amplifiers
Semiconductors, diodes, transistors
Digital logic circuits and systems

A typical “whole” mechatronics system as a “topic-case- project-based” platform for teaching the subject content of ELG3336.



Learning by Doing: Project Video

Fostering the state of flow experience

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Find out what students know and challenge.

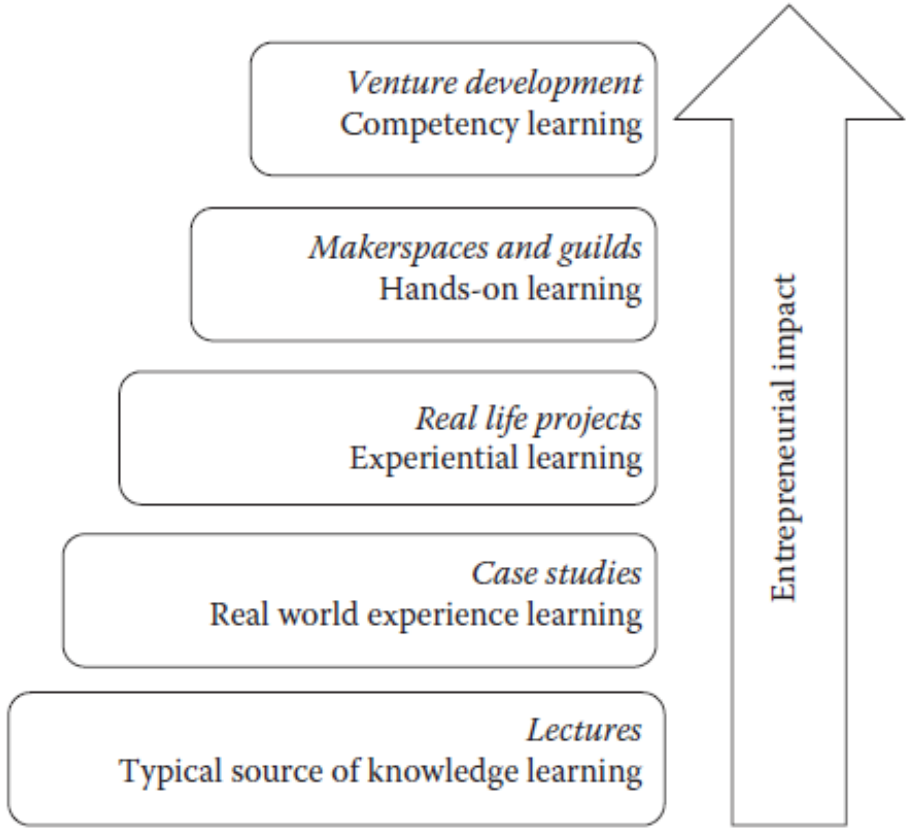
Make assignments relevant to real life applications.

Encourage choice with motivation and engagement in mind.

Set clear goals with proper feedback.

Build positive relationship.

Offer hands-on experiences.



A state of flow experience with the human hamster wheel: A collaborative uOttawa student project with Canada Science and Technology Museum

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A state of flow experience with
uOttawa SAE Aerospace
March 9, 2018
Florida Air Museum

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Questions

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a learning journey from routine and unfeeling to

enlightenment

empowerment

emancipation

entrepreneurial mindset.