10-2017

Course Transformation: Measuring Improvements in Student Learning

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COURSE TRANSFORMATION: MEASURING IMPROVEMENTS IN STUDENT LEARNING

ISSOTL CONFERENCE 2017

CALGARY, CANADA

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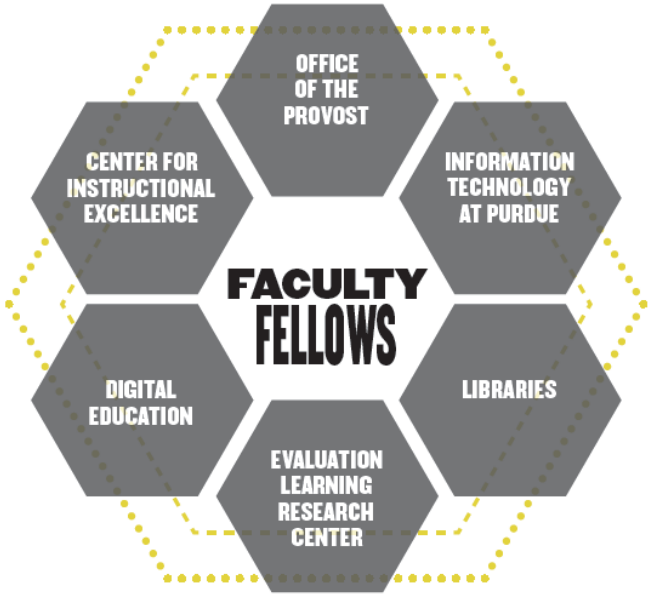
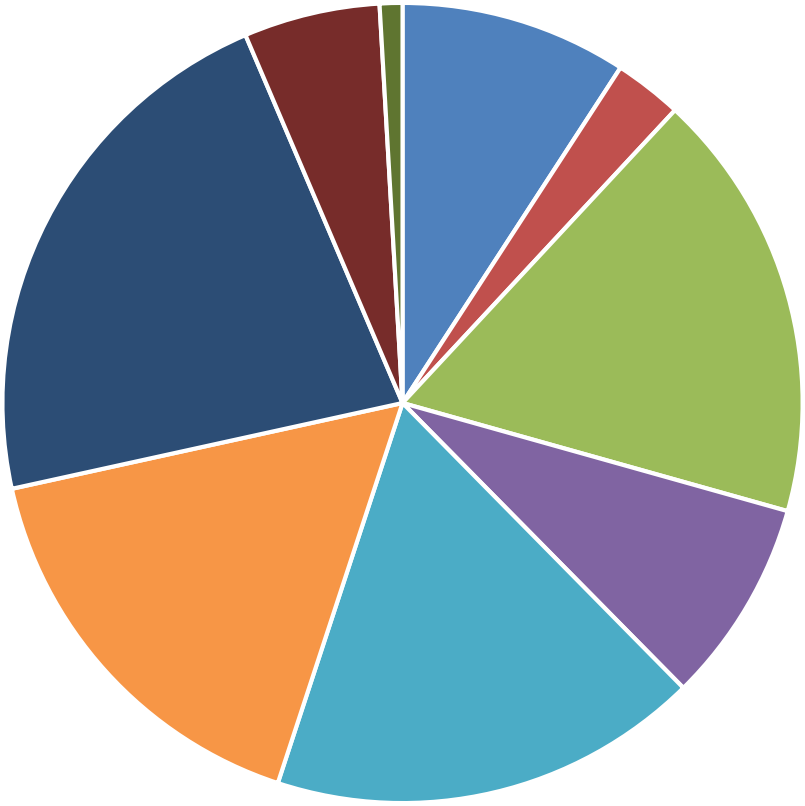
COURSE TRANSFORMATION

Instruction Matters: Purdue Academic Course Transformation (IMPACT) Program

- Semester-long faculty learning community
- Theoretical framework based on self-determination theory (SDT)



COURSES – BY COLLEGE



- College of Agriculture
- College of Education
- College of Engineering
- College of Health & Human Sci
- College of Liberal Arts
- College of Science
- College of Technology
- Krannert School of Management
- The Graduate School

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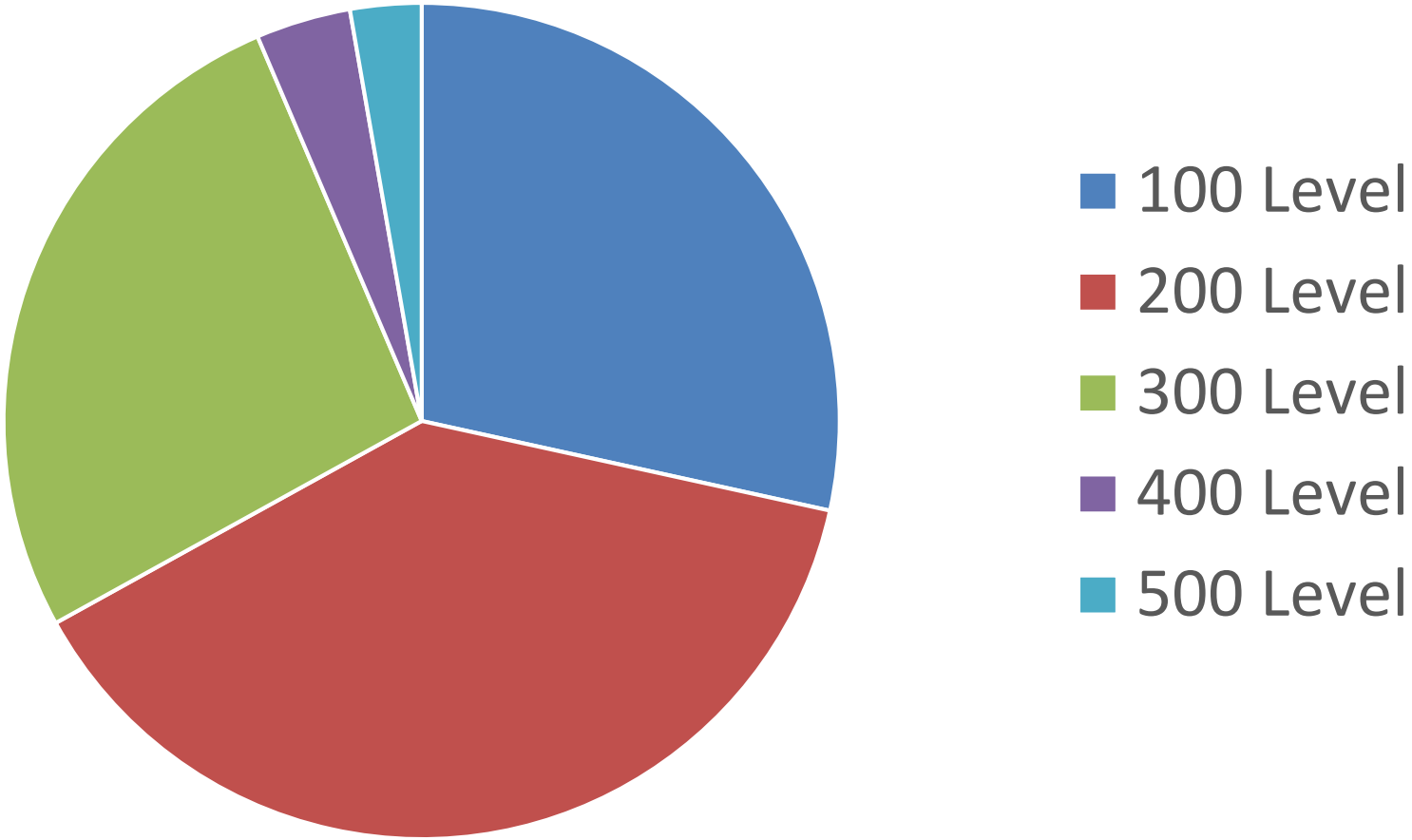
COURSES – BY LEVEL



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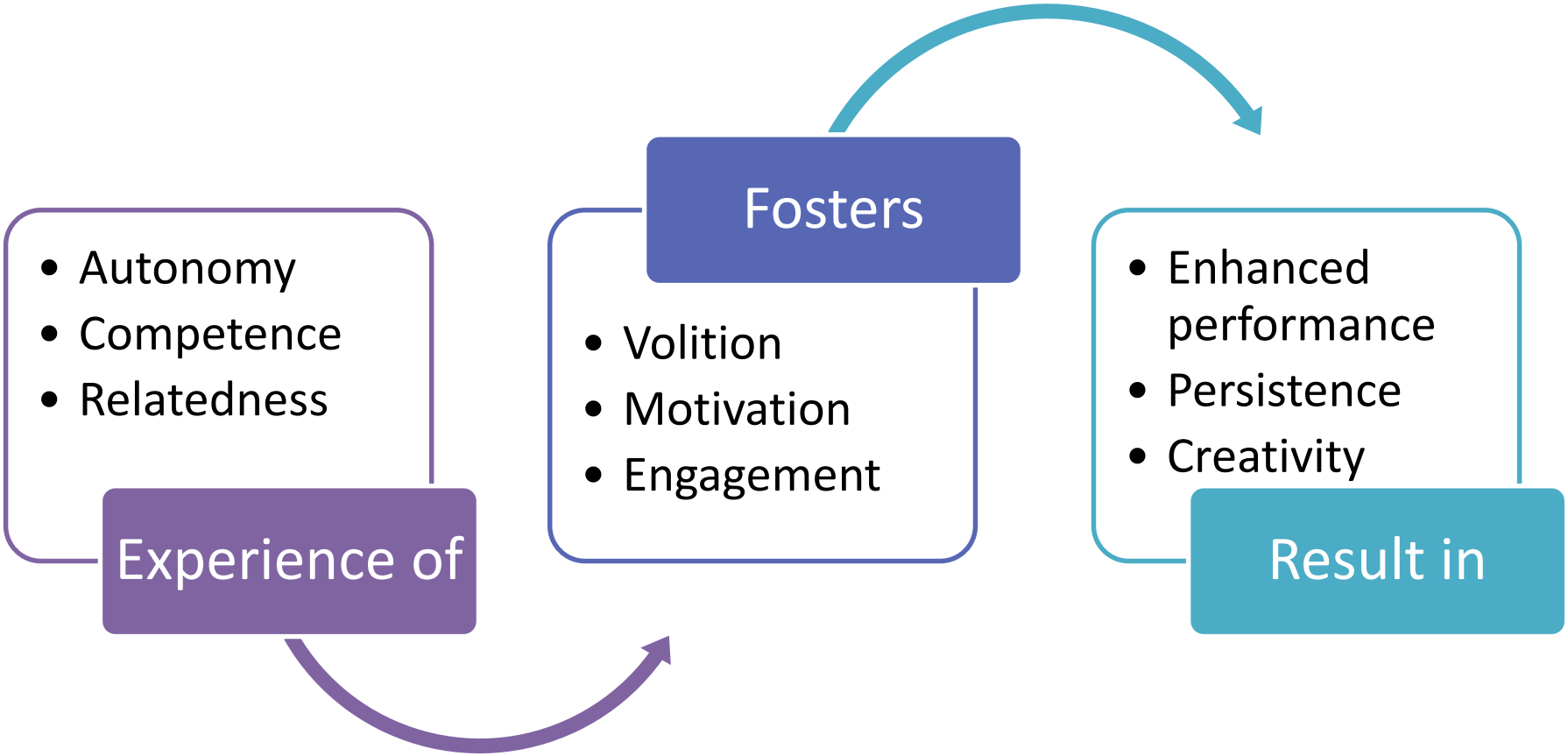
SELF-DETERMINATION THEORY

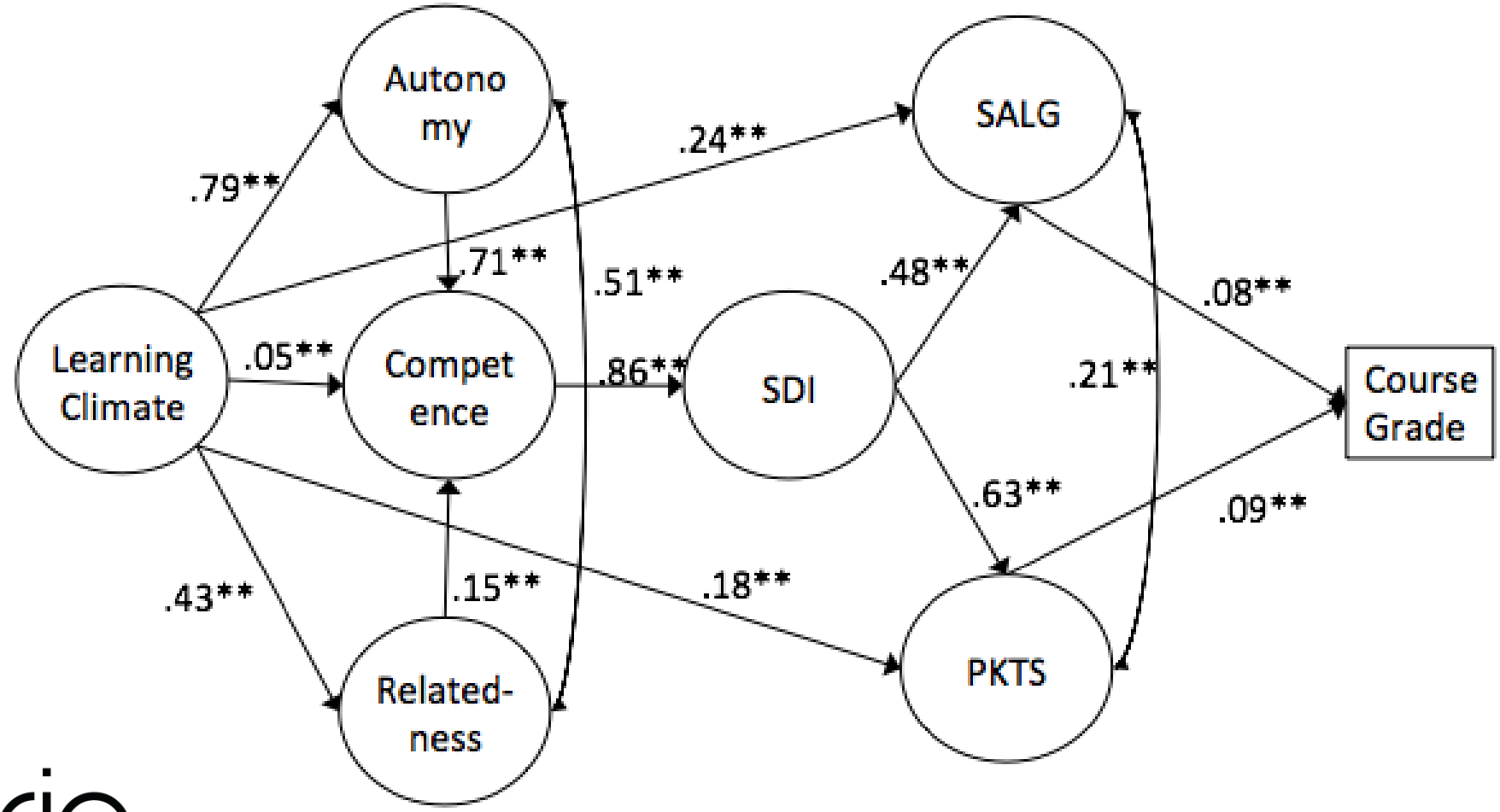


Adapted from Eunbae Lee, Georgia Southern University

DATA COLLECTION

- Student Perceptions Surveys
- Instructor Surveys
- Course Evaluations
- Faculty Focus Groups
- Registrar Data
- Faculty Deliverables

SELF-DETERMINATION MODEL



COURSE GRADE TO STUDENT LEARNING

How do we measure gains in student learning in an individual course?

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WHAT IS AN ASSESSMENT MAP?

An assessment map is a document which illustrates how an assignment (or multiple assignments) measures your learning outcomes (and possibly objectives).

WHY USE AN ASSESSMENT MAP?

COURSE PLANNING

- Provides a visual representation of the connection between your learning outcomes and your assessments

- Identifies the degree of assessment associated with each learning outcome

- Helps identify areas of misalignment

WHY USE AN ASSESSMENT MAP?

STUDENT LEARNING

- Can be used to track student progress on outcomes/objectives over the course of the semester

- Can be used to identify outcomes/objectives where students are struggling

WHY USE AN ASSESSMENT MAP?

EVALUATION/SCHOLARSHIP OF TEACHING AND LEARNING

- Are students performing better on an outcome after your course redesign?
- Are students performing better on higher order outcomes after your course redesign?

ASSESSMENT MAP DEFINITIONS

- Learning outcomes: refers to course-level goals; usually 3-5 learning per course

- Learning objectives: refers to smaller goals (unit, lesson, etc.) to help learners achieve the course-level goals

SAMPLE ASSESSMENT MAP

Final Exam/Project Assessment Template				If using final project - please attach rubric	
			Exam	Or Final Project	
LO		Bloom's #		% of grade	Note
LO1	obj 1				Bloom's Taxonomy
	obj 2				1. Remember/recall
	obj 3				2. Understand
	obj 4				3. Apply
	obj 5				4. Analyze
LO2	obj 1				5. Evaluate
	obj 2				6. Create
	obj 3				
	obj 4				
	obj 5				
LO3	obj 1				
	obj 2				
	obj 3				
	obj 4				
	obj 5				

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VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 1

AGRY/NRES 255 Outcomes
The overall learning outcomes of the course are:

(1) To be able to **explain** fundamental soils concepts including physical properties (color, structure, texture, density, porosity), soil formation (factors, processes, parent materials, and horizon development), chemical properties (soil pH, CEC), and soil classification.

(2) To be able to **apply** these concepts to **explain** erosion, water quality issues, and approaches to soil (bio)remediation.

(3) To be able to **apply** these concepts, in conjunction with physical and chemical analysis [reports] of soils, to **assess** soil health and plant nutrient metrics in **making** management decisions.

Notes: bolded and colored words signify the represented domain. Specifically:

- Understand or Remember
- Apply
- Analyze
- Create
- Evaluate

Note that the above objectives are mapped to the weekly quizzes and Exams 1-3. This map does not include mapping to lab packets, iClicker questions, in-class exercises, lab hand-ins, the final exam or recitation activities which also support the objectives. Thus, where no direct linkage of an objective to an assessment mechanism is noted, it is assessed through one of these other methods.

VARIETY OF COURSE MODELS

	Module #	Objective #	Objective	Quiz 1	Quiz 2	Quiz 3	Quiz 4	Exam 1
OUTCOME 1	1	1	Use the Munsell system to **describe** soil color and **explain** the Munsell code including the concepts of hue, value, and chroma.	X				X
		2	**Name** and **explain** the origin of the colors in soil which are caused by iron, by organic matter, and the colors observed in the absence of iron and organic matter.	X				X
		3	**Discuss** how and why surface and subsoil soil colors change as one goes from well drained to poorly drained soil.					X
		4	**List** the particle size limits for sand, silt, and clay.	X				X
		5	Given an unlabeled textural triangle, **explain** its general organization and	X				
		6	Given a sample of soil, **determine** its texture by feel, placing it in its correct textural class.	X				X
		7	**Define** "texture" and "structure".					
		8	**Define** "ped", and discuss how peds are formed.					
		9	**Identify** and **describe** the two "structureless" conditions in soil: single grained and massive.					
		10	**Identify** and **describe** granular, platy, blocky, and prismatic soil structures either when given sample peds or in a monolith.	X				
		11	**Define** the soil horizons listed in the study guide and recognize them when obviously present in a profile (monolith).	X				X
		12	**Distinguish** and **describe** soil horizons in the 0-122 cm (0-4 ft.) cores provided.	X				X
		13	**Identify**, **name**, and **discuss** the visible features such as structure, color, and obvious horizon boundaries in the "Soil-of-the-Week".					
		14	Given several soil profile descriptions, **select** the one which matches a soil core using the characteristics of color, texture, and horizon boundaries.					
	2	1	**Name** and **write** the chemical formula for the oxidation states of iron in soil and identify the soil colors associated with each oxidation state.		X			X

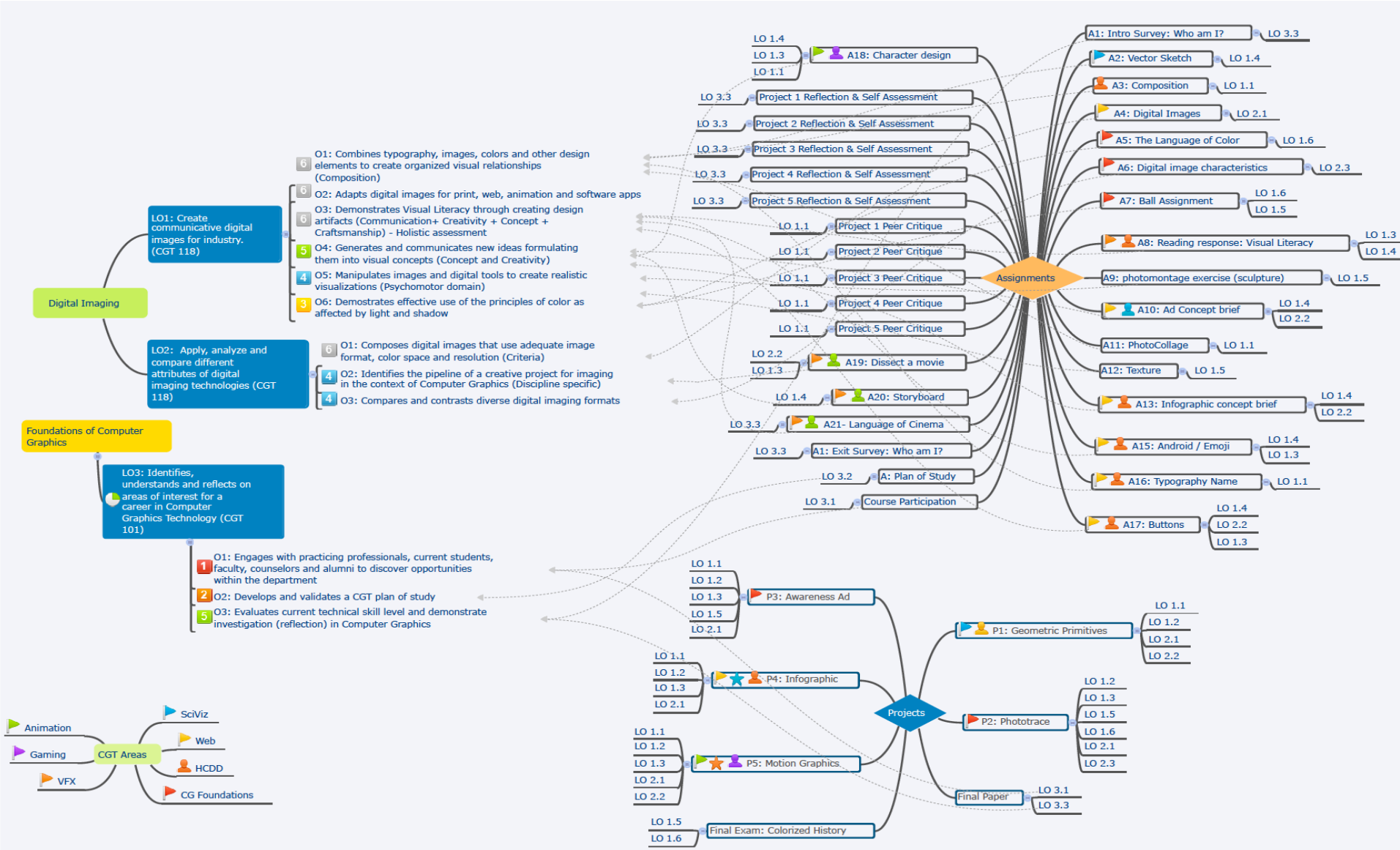
VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 2

Final Exam/Project Assessment Template: Landscape Architecture											
		Assignment 01 Photoshop		Assignment 02 Ill/InDesign		Assignment 03 AutoCAD		Assignment 04 3ds Max		Assignment 05 Portfolio	
Learning Outcome	Objective	Bloom's #	Assessment %	Bloom's #	Assessment %	Bloom's #	Assessment %	Bloom's #	Assessment %	Bloom's #	Assessment %
LO2											
Develop and refine a personal graphic style along with a critical "designer's eye" through formal presentation and discussion		6		6		3		6		6	
	Develop communicative skills to explain opinions on designed and presented work	3	30% Pin-up Critique	3	30% Pin-up Critique	-		3	30% Pin-up Critique	3	20% "Story-telling"
	Explore various graphic styles through iteration and experimentation	6	40% Graphic Style	6	40% Graphic Style	-		6	40% Graphic Style	6	40% Graphic Style
	Create your own personal style that follows communicative norms using basic professional standards	6	40% Graphic Style	6	40% Graphic Style	3	20%	6	40% Graphic Style	6	40% Graphic Style

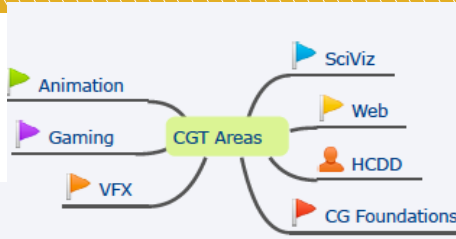
VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 3



VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 3



Projects

- P3: Awareness Ad
  - LO 1.1
  - LO 1.2
  - LO 1.3
  - LO 1.5
  - LO 2.1
- P1: Geometric Primitives
  - LO 1.1
  - LO 1.2
  - LO 2.1
  - LO 2.2
- P4: Infographic
  - LO 1.1
  - LO 1.2
  - LO 1.3
  - LO 2.1
- P2: Phototrace
  - LO 1.2
  - LO 1.3
  - LO 1.5
  - LO 1.6
  - LO 2.1
  - LO 2.3
- P5: Motion Graphics
  - LO 1.1
  - LO 1.2
  - LO 1.3
  - LO 2.1
  - LO 2.2
- Final Paper
  - LO 3.1
  - LO 3.3
- Final Exam: Colorized History
  - LO 1.5
  - LO 1.6

AGRICULTURAL ECONOMICS EXAMPLE

AGRICULTURAL ECONOMICS

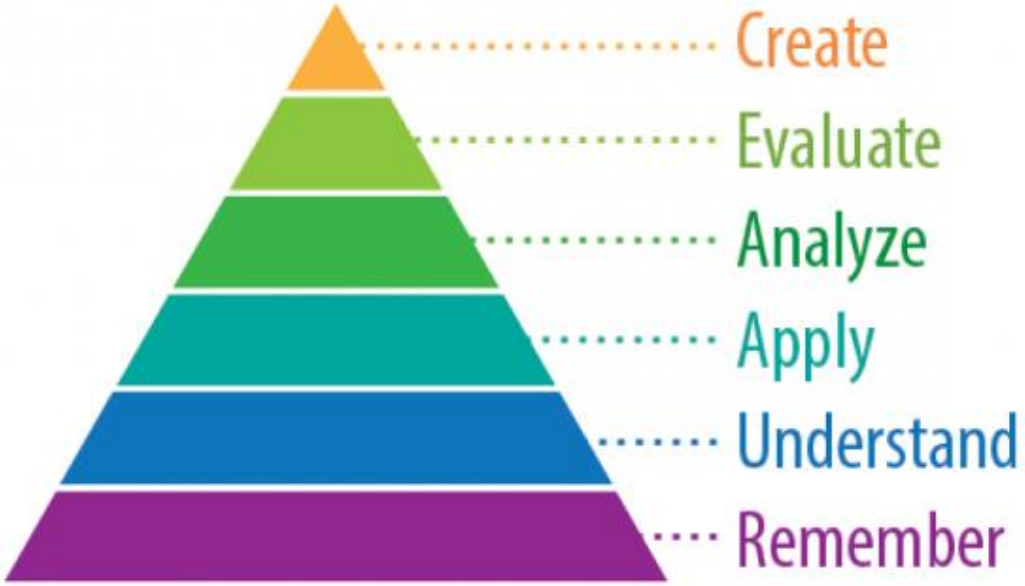
- Introduction to economics course
- 300+ students
- Redesigned in Spring 2013

AGEC 217: BEFORE IMPACT

- You will ***learn*** about the causes of inflation and unemployment, why economies grow or decline, and what government policy can (and cannot) do to help.
- You'll ***learn*** about the history of how we've tried to keep the economy stable and growing.
- You'll ***learn*** about the effects of war on the economy.
- You'll ***learn*** how the emerging global economy affects incomes, prices and your job prospects here in the U.S.

AGEC 217: AFTER IMPACT

- **Analyze** the important economic policy issues facing the U.S. using the macroeconomic model and the main economic measurements, such as budget deficits, monetary expansion, health care costs, Social Security finance, recovery from Great Recession, or relations with Europe and China.
- **Describe** the condition of the economy using the main economic measurements: gross domestic product, inflation, unemployment, exchange rates, and interest rates.
- **Predict** the results of economic events or policy changes on the outlook for the economy, using a macroeconomic model.
- **Analyze** the important events in U.S. economic policy history using the macroeconomic model and the main economic measurements, such as bimetallism, the founding of the Fed, the Great Depression, the New Deal, World War II, the Great Inflation, or the Great Recession.
- **Predict** changes in prices and quantities in a market using demand and supply analysis.



BLOOM'S TAXONOMY

EXAM QUESTION DISTRIBUTION

Question Taxonomy	2012 Spring	2012 Fall	2013 Fall	2014 Spring	2014 Fall
1 and 2	68%	68%	48%	48%	38%
3 and 4	32%	32%	52%	52%	62%
Articles (3/4)	2%	0%	18%	30%	34%

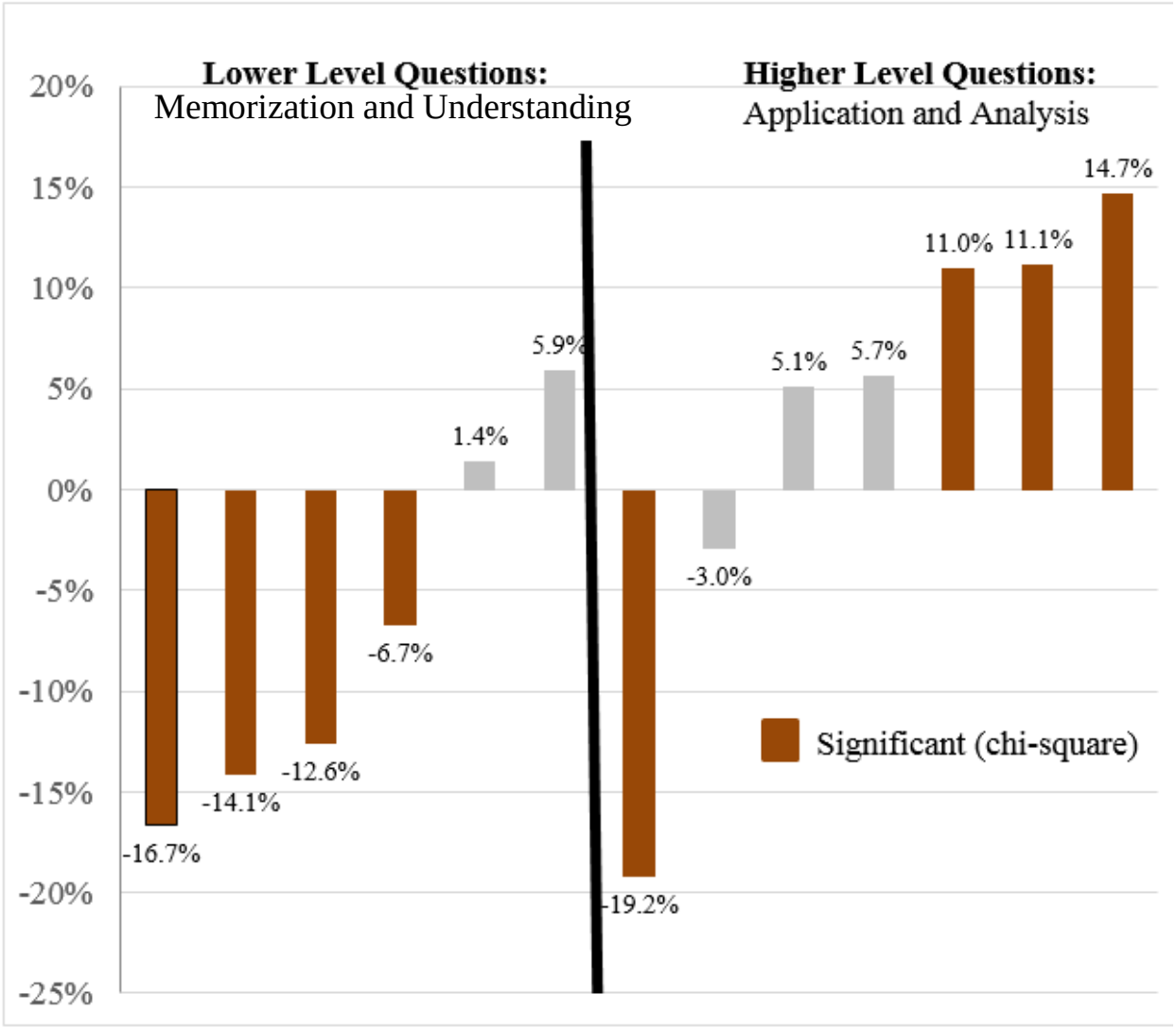


Figure 1: Change in student performance on exam questions before and after course re-design

Josephson, DeBoer, Nelson & Zissimopoulos, "Reshaped for Higher Order Learning: Student Outcomes in the Redesign of an Undergraduate Macroeconomics Course," Presented at American Economic Association meetings, January 2017.

Thank you!

Questions?