Applying Project-Based Learning for an Online Object-Oriented Systems Course

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Course Structure: ITCS 3112 Design and Development of Object Oriented Systems (External Review in Progress, Quality Matters) **Old Structure Online Course Structure Homepage Navigation Structure** Project-Based Structure III * Module 2: C++ Program Structure, Control Flow, I/O 0 + : 502 Preparation Lecture on Topic ~ M2-Module Overview 0 Pre-reading. Set up Milestone #module <1> #module <2> #module <3> A2-Discussion/Q&A 0 Memory Allocation Software Tools C++ Program Milestone 1 0 Installation and Structure 2D Images (Arrays), Problem Definition Quiz Control Flow, 1/0 Testino Greedu Algorithm Plan and design the solution M2-1: Preparation 0 M2-2: Problem Definition/Tasks • Sep 4 2018 | 15 **Problem Solving** • Assign Project Implement and document the #module <5> #module <6> 2 #module <4> Milestone 1: Turn In 0 lestone solution 12 C++ Classes: **BRIDGES Class** Class Inheritance, Hierarchy. mage Applicatio Creation, Access Polymorphism Milestone 2 BRIDGES real-world projects taught Overloading M2-4: Implement/Document 0 Feedback **Test Solution** 503 Test for accuracy and M2-5: Testing/Accuracy Check 0 #module <7> requirements Term Project Milestone 2: Turn In • Phase 1 Phase 2 Phase 3 Phase 4 Turn-In Project M2-6: Reflection 0 Project Design Implementation Submission & eflection Reflection M2-Refl-Quiz Sep 7, 2018 | 5 pt 0

Research Design

Research Question:

How do we characterize student reflections in an online project-based course?

Sample: 49 students (juniors / seniors)

Projects: Real-world projects from BRIDGES

Project-Based Learning

for Online CS Courses

· PBL: An approach to develop in

problem-solving and practice

· Use projects as a means for

Multi-cycles of "working-thru"

metacognition

students a routine of *systematic*

learning, than a means to assess

problems with *reflection* to promote

start with analysis and design logic

· Break down computing problems to

with a different methodology

Plan first, Code later.

Modality: Fully online course

Data Collection: 4 Modules (112 reflection posts)

Data Analysis: Content analysis of reflections to generate themes

Theoretical Framework:



What Made Projects Engaging

1. Sense of challenge

- 2. Free tinkering
- 3. Flowcharts before coding
- 4. Problems applicable across platforms

What Helps Me/Others Progress

- 1. Pre-loaded software
- 2. Visual & clear instructions
- 3. Rhythm, structure, & schedule
- 4. Scaffolded projects

The assignment was pretty fun and I took more time on it then I had to because I was having fun doing different things to make the face look more like a surprised face!

I loved interacting with bridges to visualize [the Colorado Mountains]. It challenged my programming ability... just difficult enough where I could feel challenged, but also feel satisfied.

Emerging Themes

What Made Projects Demanding

- 1. Time
- 2. Unstable software tools
- 3. Lack of documentation or tutorials

How | Feel

- 1. Sense of personal progress
- 2. Sense of accomplishment
- 3. Sense of regret

The assignment helped me visualize the data on a grid. I was able to get some graph paper and draw what I wanted my face to look before putting it into code blocks... never had to visualize it like this assignment had me do.

Considering it is an online class, and some people are more visual learners, it may help to have additional visuals.. on the instructions for installation and manipulation of the VM and code::blocks software.

Implications

- 1. Students tap not one, but a combination of metacognitive areas (i.e. person, task, strategy).
- 2. More students reflect on prior experience (what happened or what they did).
- 3. Fewer students reflect on how they can do better to manage or improve learning.

Reflections enable:

- Understanding of "How I Learn"
- · Monitoring of progress and mistakes
- Communication with instructor (early alerts)

PBL supports students:

- Start projects early (project management)
- Strengthen analysis & design skills (logic)
- Accomplish mini goals (scaffolding)