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

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Project-Based Learning for Online CS Courses

- PBL: An approach to develop in students a routine of systematic problem-solving and practice
- Use projects as a means for learning, rather than a means to assess
- Multi-cycles of "working-thru" problems with reflection to promote metacognition
- Break down computing problems to start with analysis and design logic
- BRIDGES real-world projects taught with a different methodology
- Plan first, Code later.

Course Structure: ITCS 3112 Design and Development of Object Oriented Systems

(External Review in Progress, Quality Matters)

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

Modality: Fully online course

Data Collection: 4 Modules (112 reflection posts)

Data Analysis: Content analysis of reflections to generate themes

Theoretical Framework:

Emerging Themes

What Made Projects Engaging
1. Sense of challenge
2. Free tinkering
3. Flowcharts before coding
4. Problems applicable across platforms

What Made Projects Demanding
1. Time
2. Unstable software tools
3. Lack of documentation or tutorials

What Helps Me/Others Progress
1. Pre-loaded software
2. Visual & clear instructions
3. Rhythm, structure, & schedule
4. Scaffolded projects

How I Feel
1. Sense of personal progress
2. Sense of accomplishment
3. Sense of regret

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)

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.

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Old Structure

Preparation
Pre-reading, Set-up

Problem Definition
Plan and design the solution

Problem Solving
Implement and document the solution

Test Solution
Test for accuracy and requirements

Reflection

Project-Based Structure

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