Guiding Principles for Assessing Software Engineering Teams

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Motivation

- Variations around how best to evaluate capstone project teams
  - Teams work on different client projects
  - Account for individual workload contributions
  - Incorporate peer evaluation feedback
  - Which approach fosters collaboration and deeper learning experiences?

Research Questions

- Examination of 12 years of teaching practice in software engineering capstone course

1. What are the necessary capstone evaluation components?
2. How do various assessment activities align with learning theories that promote deep learning experiences?
3. What are the assessment challenges encountered due to an increase in enrollment?

Learning Theories

Constructivism

Behaviorism

Social Constructivism

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Behaviorism

- Principle of stimulus and response
- Learn based on environmental conditions
- Help learners form habits
- Give positive reinforcements to desirable behaviors
- Teachers are in control
- Students are passive learners who soak up content

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- Learners actively create meaning
- Students bring their own perspectives to interpret and shape their understanding
- Knowledge is negotiated
- Focus on students, not teachers
- Promotes active engagement

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Social Constructivism

- Learning is a social process
- Situated in society and culture
- Reliance on others to construct knowledge

Course Design Evolution Over 12 Years

- Course learning outcomes
- Major Milestones and Deliverables
- Team Roles
- Weekly Interactions and Assessments
- Evaluation Criteria
- Peer Evaluations

RQ3: Added Challenges for Large Classes

- Number and availability of clients
- Reduced contact time per student/team
- Lack of time to engage collaboratively with students
- Harder to change student mindset
- Tradeoffs between team size and number of teams
- Reliance on good TA training serving as instructor surrogates
- Difficulty in monitoring team/individual progress closely

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RQ2: Alignment with Learning Theories

- Certain assessments value behaviors over knowledge enhancement
  - Students don't buy into learning goals
  - Do not complete work for the sake of learning
  - No reward for greater degree of improvement
- Increased class size means less active engagement
  - Fewer opportunities for client, staff, student interaction
- Some students come with behaviorist mindset
  - Do not give or take feedback seriously
  - Difficulty embracing open-ended projects

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RQ1: Necessary Evaluation Components

- Certain evaluations foster deeper learning opportunities
  - Team project that assesses deliverable quality and **collaboration process**
  - Regular peer evaluations with **constructive feedback**
  - Real-world industry project offering **external validation** and client interaction
  - Problem-solving sessions to **assist knowledge construction**
  - **Assessments of individual competencies** and use of industry practices
  - **Peer testing** sessions with students and teaching staff
  - **In-person presentations** to clients

Guiding Principles in Large Classes

- Purpose of evaluation components
  - Clients
    - External validation
    - Understand industry norms
  - Team
    - Foster collaboration
    - Process measured against industry processes
  - Individual
    - Accountability to team and client
    - Assess core competencies
    - May involve testing and examination

Guiding Principles (cont.)

- Student motivation
  - Deliverables need to be meaningful and relevant
  - Ideally incorporates choice and freedom
- Fairness
  - Use of peer evaluations
  - Confidentiality of peer evaluations
  - Weekly (close-ended) temperature checks
- Fostering team self-regulation
  - Less reliance on teaching staff for progress monitoring