Contextualized Learning and Assessment

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Main Take-Away Points

- Contextualized instruction involves developing activities that:
  - Involve students in applying knowledge in real world situations
  - Involve students working on teams
  - Involve students in reflecting on what they learned through the activity
  - Involve teachers in coaching more, which requires more formative assessment

Contextualized learning:
What is it? Why do it?

- "Material is taught in a context in which it would be used in 'real life.' The underlying assumption is that the context provides meaningfulness to abstract information, making it more concrete and therefore, easier to learn." (Herod, 2002)

Contextualized learning: What is it? Why do it?

- A diverse family of instructional strategies designed to more seamlessly link the learning of foundational skills and academic or occupational content by focusing teaching and learning squarely on concrete applications in a specific context that is of interest to the student. (Mazzeo et al., 2003, pp. 3–4; as cited by Perin, 2010)

Contextualized learning: What is it? Why do it?

- "Contextual learning theory…
  - focuses on the multiple aspects of any learning environment…
  - "encourages educators to … design learning environments that incorporate as many different forms of experience as possible (social, cultural, physical, and psychological)
- "Students discover…
  - concepts are internalized through the process of discovering, reinforcing, and relating." (CORD, 2010)

Contextualized learning: What is it? Why do it?

- Contextual teaching and learning strategies:
  - Problem-based; learning across school/home/work; team-based; trial-and-error with reflection; assessed "authentically"
- Contextual Teaching and Learning (CTL) helps…
  - motivate students to engage in hard work that learning requires (TeachNet, University of Wisconsin-Madison, 2011)

The theory: In a nutshell

- **Constructivism:** People build their own knowledge, and their prior knowledge influences what they learn

- **Social constructivism:** People adopt values and tools from surrounding culture, and people with diverse skills teach one another

- **Cognitive processing:** People develop deep structures by engaging in concrete problems in a trial-error way, and deep structures help them transfer knowledge to new problems.

Contextualized learning:
Getting from here to there

HERE

- List of topics to "cover"

- Lectures and textbook chapters

- Worksheet exercises

- Quizzes and tests focused on recall and rote procedures

THERE

- Activities that *enhance knowledge application*

- Activities that *engage student teams*

- Activities that *support student reflection*

- Assessments that measure *different ways students apply* knowledge and skills

Move 1:
From topic lists to knowledge application

General Course

- Poll students for job interests, majors
- What "general skills" are needed in those jobs & majors?

Majors or Technical Course

- Review activities in jobs and real world where students will apply knowledge they learn in your course
- What "basic skills" or "key technical knowledge" are needed do engage in those activities?

Move 1:
From topic lists to knowledge application

Tips for reviews (Yarnall et al., in press):

- Talk with someone who *on the job or in the major* to find out when & how basic skills or key technical knowledge are applied

- Review following:
  - What key ideas or principles are most important to solving problems in the workplace or major?
  - What procedures and tools are most important to use in the workplace or major?
  - How are the ideas and/or tools used in the workplace or major?

Move 1:
From topic lists to knowledge application

- Examples:
  - Engineers using *scientific method* to test robots
  - Bioinformatics researchers using *statistics and line and bar charts* to understand how viruses evolve and propagate

Discussion around Move 1:
From topic lists to knowledge application

- What workplace or advanced academic activities have you considered or found for your courses?

  - How do these activities embody…
  - The big ideas or principles you teach? or
  - The specific procedures or tools you teach?

Move 2:
From lectures/textbooks to team activities

- Review your lectures and textbook readings for topics that are not engaging your students

- Based on interviews with those who do work in the relevant fields, identify real world tasks that **groups of students** can complete

Move 2:
From lectures/textbooks to team activities

- Tips for selecting tasks (Jonassen, 2000):
  - Structuredness: Tight→Loose
    - Are rules/procedures important? -- Tight
    - Is creativity/brainstorming important? -- Loose
  - Complexity: Simple→Complex
    - Are basic conceptual connections being made? – Simple
    - Is orchestrating multiple factors important? – Complex
  - Domain specificity: Low→High
    - Is basic knowledge/skill important? – Low
    - Are specific vocabulary, procedures, and standards key? – High

Move 2:
From lectures/textbooks to team activities

- Examples:
  - Bioinformatics requires the use of specific online databases and graphing software, so team activities focused initially on having students use all these tools
    - Task: tight/complex/specific: Good for ensuring understanding of complex procedures

Move 2:
From lectures/textbooks to team activities

- Examples:
  - Engineering requires application of principles of simple machines, so team activities involved students in reviewing how different kinds of machine principles could be used with a robot to rescue victims from an earthquake building collapse
    - Task: loose/simple/specific: Good for seeing with the conceptual lens

Discussion on Move 2:
From lectures/textbooks to team activities

- What kind of tasks do you think you need to teach the important elements in your classes?
  - Tightly or loosely structured?
  - Simple or complex?
  - Domain specific or general?

Move 3:
From worksheets to student reflection

- Review existing resources for good reflection questions

- Based on interviews with those who do work in relevant fields, identify **presentation formats** for students to share their reflections

Move 3:
From worksheets to student reflection

Tips for focusing reflection during presentations:

- Ask questions that focus students on the "big ideas" or the "troubleshooting insights" that are most important for those who work in the field

- After students share, be sure to make connections to key ideas to reinforce student learning

Move 3:
From worksheets to student reflection

Examples:

- In a network security task, students shared the ways they found anomalous patterns in network log data – a key insight

- In another network security task, students found they had to shift from a pure technical focus to one integrating audience concerns about budget – an important big idea

Move 3:
From worksheets to student reflection

What kinds of insights have students shared with you after completing a task in your courses?

How can such insights help students as learners in your subject area?

Move 4:
From quizzes/tests to integrated assessments

Consider how student learning from a task aligns with:

- Exit or licensing exam items
- Industry or subject standards

Include more formative assessments to support learning of:

- Technical processes (content-specific)
- Social processes (teamwork and project management)
- Social-technical processes (communication approaches with different audiences, e.g., formal proposal vs. meeting presentation)

Move 4:
From quizzes/tests to integrated assessments

Tips for alignment and formative assessments (Yarnall et al., in press; Yarnall et al., 2011):

– To what extent does the new task give students an opportunity to learn knowledge and skills assessed in existing exams?

– What kinds of behaviors and aspects of work products demonstrate proficiency? Technical, social, and social-technical?

  • Formatively assess those

Move 4:
From quizzes/tests to integrated assessments

Examples:

- Computer programmers: When they use specific types of efficient programming steps, such as loops, this is evidence of doing the work well.

- Environmental science: When they consider various consequences on a natural habitat caused by human activities, this is evidence of doing the work well.

Move 4:
From quizzes/tests to integrated assessments

Develop rubrics and assessments that measure evidence of knowledge application:

- Focus on the key behaviors that distinguish a stronger performance from a weaker one

- Describe in concrete terms those ranges of performance in a rubric from high to low

- Share that rubric with students early in the lesson

- Give students a chance to rate their own performances or their peers' using the rubrics

Move 4:
From quizzes/tests to integrated assessments

What experiences have you had with aligning a new classroom activity with existing exams?

What kinds of coaching have you provided to students improve their process skills in your courses?

Main Take-Away Points

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Closing

- Additional resources:
  - Perin's review of contextualized learning: http://tiny.cc/pzq9w
  - Jonassen's problem design framework: http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ620216
  - Yarnall et al.'s assessment design article: Contact me for information at louise.yarnall@sri.com