



Improving STEM Learning Through Backwards Design

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2012 GSA/NAGT Short Course



It's about CHANGE.

Traditional

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Assessment

“Assessment is the ongoing process of establishing

- clear, measurable expected outcomes of student learning,
- ensuring that students have sufficient opportunities to achieve those outcomes,
- systematically gathering, analyzing, and interpreting evidence to determine how well students learning matches the expectations and
- using the resulting information to understand and IMPROVE student learning.”

Suskie, L. (2009) *Assessing student learning: A common sense guide*. San Francisco: Jossey-Bass.

Adopted from Weinstein, *Maintaining quality in blended learning: From classroom assessment to impact evaluation*. Educause. 2012 GSA/NAGT Short Course



Evaluation

“Evaluation is the analysis and use of data by faculty to make judgments about student performance. Evaluation includes the determination of a grade or a decision regarding pass/fail for an individual assignment or for a course.”

Goldman and Zakel (2009)

Adopted from Weinstein, *Maintaining quality in blended learning: From classroom assessment to impact evaluation*. Educause. 2012 GSA/NAGT Short Course

IT'S TIME FOR **ATM** TEXAS A&M UNIVERSITY

GEOLOGY & GEOPHYSICS AT TEXAS A&M UNIVERSITY

Backwards Design

1. Learning Objective

2. Assignment

3. Learning Activities

Wiggins and McTighe (1998), Understanding by Design http://pixel.fhda.edu/id/six_facets.html

Adopted from Weinstein, Maintaining quality in blended learning: From classroom assessment to impact evaluation. Educause.

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Learning Objective

At the end of this course, students will be able to evaluate an empirical research article

Assignment

Team project: Find an empirical article on a topic of personal interest and collaboratively evaluate the article using a wiki

Learning Activities

- a. Students will read an article
- b. Instructor will model an article critique in class

http://pixel.fhda.edu/id/six_facets.html

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Stage 1. Identify Desired Results

Wiggins and McTighe ask instructors to consider not only the course goals and objectives, but also the learning that should endure over the long term.

- Enduring value beyond the classroom
- Resides at the heart of the discipline
- Required uncoverage of abstract or often misunderstood ideas
- Offer potential for engaging students

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Stage 2. Assessment of Learning

The second stage in the design process is to define what forms of assessment will demonstrate that instruction achieved the desired objectives.

- Performance Task— The performance task is at the heart of the learning. A performance task is meant to be a real-world challenge in the thoughtful and effective use of knowledge and skill— an authentic test of understanding, in context.
- Criteria Referenced Assessment (quizzes, test, prompts). These provide instructor and student with feedback on how well the facts and concepts are being understood.
- Unprompted Assessment and Self-Assessment (observations, dialogues, etc.).

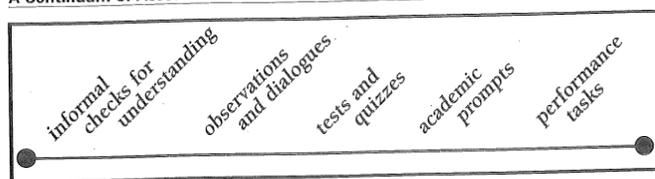
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Stage 3. Instructional Activities

In this stage, it is determined what sequence of teaching and learning experiences will equip students to develop and demonstrate the desired understanding and create the evidence required by the assessment.

Figure 7.4
A Continuum of Assessments



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Learning Objective	Taxonomy	Evaluation	Teaching Strategies	Face-to-face/Online connection
Write a specific, learner-centered, measureable objective	Match the objective to the closest equivalent of Bloom's taxonomy	How you will evaluate the students on this objective? What is the best format for the evaluation?	What teaching activity you will use to prepare students to meet objective? What is the best format for the teaching strategies?	How are the face-to-face activities connected to the online activities?
At the end of this course, students will be able to evaluate an empirical research article.	Evaluating	Team project: Find an empirical article on a topic of interest and collaborate to evaluate the article using a wiki.	Instructor will model an article critique (in class).	Instructor modeling the critique links to students practicing the critique in the online environment.

Adapted from Synthesis Worksheet: http://www.schreyerstitute.psu.edu/pdf/Synthesis_Worksheet.pdf

Adopted from Weinstein, *Maintaining quality in blended learning: From classroom assessment to impact evaluation*. Educause. 2012 GSA/NAGT Short Course



Backwards Design

Review of Handouts on Backwards Design



Last Activity: Rewriting Learning Goals

In this activity, we will use existing instructional materials from two courses (historical geology or structural geology) to infer the learning goals of the authors of the instructional materials and suggest other learning goals that may be appropriate if the instructional activity was changed.