How to Effectively Assess Online Learning

By John Orlando, Ph.D.

A Magna Publications White Paper

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ABOUT THIS WHITE PAPER

John Orlando, Ph.D., has been involved in online teaching and administration since 2000. He helped establish and grow online course programs at the University of Vermont and Norwich University. He has also published over 30 works and given over 40 presentations on online education, developing online programs, training faculty to teach online, and teaching with technology.

Much of John's research focus is on how to integrate social media into education. He has been a leader in the use of new technology in education and consults with universities that are starting or growing online course programs.

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Contents

Introduction: The Revolution in Learning

Business has a saying: "That which gets measured gets done." Yet higher education has traditionally had a hard time with assessment. The focus has been on teaching but not on measuring if learning has occurred. This is why assessment has become a hot topic in the field, as both accrediting bodies and the United States Department of Education are demanding more evidence of actual learning from colleges and universities.

Part of the problem is that assessment of learning is difficult. If the ultimate goal of education is to prepare someone to do something, then the best assessment is to simply have him or her do it. This was how it was done for thousands of years in the first learning method – the apprenticeship system. But higher education moved away from that model when it took the learners out of the environment in which they would be working and sequestered them in a classroom. Not only was teaching separated from doing, but now it was partitioned into discrete units of time – 50 minutes, three times per week, for 15 weeks – in order to meet the seat-time requirement for credits, apart from consideration of whether this was really the best schedule for producing learning.

Assessment became equally abstracted from the learning outcome. A business school preparing students to become CEOs could not make students CEOs at the end of their education to assess outcomes. Assessment, by necessity, gravitated toward the "classroom skills" of paper writing, test taking, and the like because it was connected to teaching in the classroom. In other words, students were being assessed on their ability to capture what was fed to them in the classroom environment, not on the final skills that had been assessed in the master/apprentice model.

To be fair, the exegesis of higher education limited the range of teaching and assessment methods. Financial models that require an instructor to teach a group of students at once, as well as the scheduling constraints of teaching in a physical classroom, necessitated different methods of teaching and assessment from the master/apprentice days.

Online education came along to free learning from the physical limitations of the classroom environment. Yet to a great extent academia simply applied the traditional classroom model to the online environment. It was not until social media appeared just after 2000 that the full potential of the Internet was realized. The emergence of social media dramatically widened the range of education and assessment tools available to educators. Social media turned the student from a passive recipient to an active participant, thus opening the possibility of assessment based on "doing."

We will again ask how the principles of assessment apply to this new environment, what opportunities the environment presents, and how eLearning 2.0 assessment differs from assessment in a traditional learning management system-based online classroom.

RESOURCES

Jeff Javis—This Is Bull....
http://www.youtube.com/watch?v=rTOLkm5hNNU&feature=player_embedded#!
A discussion of how traditional education is built on a model of transfer of knowledge from instructor to student but more and more people are reversing the flow by making education a collaborative experience.

The Networked Student
http://www.youtube.com/watch?v=XwM4ieFOotA
A Common Craft video on the personal learning network and connectivism.

From E-Learning to Social Learning
http://www.slideshare.net/janehart/from-elearning-to-social-learning
A good slideshow on the limits of traditional online education.

Interview with Charles Fadel on the Neuroscience of Learning
http://www.learncentral.org/event/90712
Interesting webinar on how learning is not a transfer of information but rather an activity.

① Part One: Fundamentals of Assessment

Curriculum, instruction, and assessment: the three fundamental components of an education system, whether online or face to face. Author Milton Chen calls these the "three legs of the classroom stool" and reminds us that each leg must be equally strong in order for the "stool" to function properly, balanced and supportive. Habitually, the questions *What am I going to teach* and *How am I going to teach it?* weigh heavier on an instructor's mind than *How will I assess?* As a result, the assessment "leg" of the classroom stool is often the weakest of the three, the least understood and least effectively implemented.

Why and how do we assess students? Does the online classroom require special consideration when selecting and implementing assessments? How do effective instructors use assessment data to provide feedback to students as well as to improve their instruction? These are some of the questions that we will explore in the context of online education.

Defining Assessment

What is assessment? Jay McTighe and Grant Wiggins, in *Understanding by Design,* offer this description:

"By assessment we mean the act of determining the extent to which the desired results are on the way to being achieved and to what extent they have been achieved." (p. 6) In an education environment, the question becomes: *Are students learning (or have they learned) what we want them to learn?*

Types of Assessment — the Basics

Generally, educators classify assessment tools into three categories based on their purpose: diagnostic, formative, and summative. **Diagnostic** assessment is used to gather information about students' prior knowledge and to identify misconceptions. It *precedes* instruction and is not graded. Pretests and student surveys are two examples of diagnostic assessments that can be easily administered at the onset of an online course.

Assessment is **formative** when it gathers information in an *ongoing* manner throughout a course. That information is then used to guide teaching and to improve learning and performance. Feedback to students is a key component of formative assessment, whether the assessment is formal — a graded quiz or written assignment — or informal, such as feedback on student participation in a discussion forum.

When information about student learning is gathered and analyzed at the conclusion of a course in order to determine whether students have achieved identified goals, it is called **summative** assessment. Summative assessments typically result in a score or grade and are thus evaluative. A culminating project, final exam, performance task, or test is an example of a summative assessment.

A New View of Assessment: Assessment for Learning

Wiggins, McTighe, and others argue that using assessment simply to gather evidence about student learning is not enough; we must place assessment squarely in the service of our teaching goals. We must use assessment not only to gather evidence, but to promote deeper understanding. Wiggins terms such assessment "educative." Before we examine such assessment methods, it is important that we first consider what it means to "understand." Recall this well-known Chinese proverb:

I hear and I forget; I see and I remember; I do and I understand.

This proverb is well known to educators. Its enduring truth is affirmed not only by extensive research on the benefits of experiential learning but also by our own everyday experiences. How many of us have come to understand the processes of fixing a leaky faucet, growing prized roses, or comforting a distraught child not by reading a how-to manual or watching an expert but by doing it ourselves — and often more than once!

I hear and I forget; I see and I remember; I do and I understand.

What is implied in this proverb, of course, is that "doing" leads to understanding. But what does it mean to "understand"? We use the word frequently in writing learning objectives: "Students will understand that writers use a variety of techniques to engage their readers." "Students will understand that wetlands must be protected to maintain a clean water supply." "Students will understand there is rarely a single, obvious cause to a complex historical event." We may also replace the phrase "Students will understand that…" with "Students will know that…" However, the verbs to know and to understand are **not** the same.

How Is Understanding Different from Knowing?

A third-grade teacher once told an amusing but telling story: She was leading the class through subtraction problems that required regrouping (or "borrowing"). Referring to the calculations on the board, she pointed to the spot where a "little 1" had been written over the ones column, indicating that one group of 10 had been regrouped to the ones place. She erased the 1 and rewrote it *under* the top digit in the ones column. "Could the "1" (10) go here?" she asked. "No!" the students insisted. "Why not?" the teacher asked. "Because it always has to go on top," was the only reason the third graders could offer. "Could I make it a BIG "1" instead of little?" "No!" replied the students, "It's got to be little!" "Could I put it to the right of the numbers in the ones column?" "No!" they cried. Even though the students *knew* the algorithm for subtracting with regrouping, one could argue that their inflexibility revealed limited *understanding* of place value and the purpose of mathematical notation.

Wiggins gives another common example with which reading teachers are familiar: A student may have the skill to read (decode) words and may even know the meaning of the individual words but be unable to *understand* what he or she read.

Knowledge comprises a body of facts or claims that can be verified. Understanding involves making sense of facts. We can "know" words, events, definitions, musical notes. We can possess "knowhow," or the skill to tie a shoe, fly a kite, dissect a frog, and give a compliment. Understanding, by contrast, seeks the "why" behind facts or phenomena. It begins with acquiring certain knowledge and/or skill, but it also involves active mental or physical engagement to grapple with new ideas or challenging situations. This brings us to the idea of understanding as *knowledge transfer*. Students can demonstrate their understanding when they are presented with a novel, puzzling problem, or task and must figure out what to do by marshaling the necessary skills and knowledge acquired in the course.

Assessing for Understanding

Just because we teach something doesn't mean students have learned it – or understood it! If promoting knowledge transfer is indeed our mission, if deep understanding is what we are attempting to nurture in our teaching, how can we be sure we've done our job?

Have you heard this joke?

Boy 1, referring to a pet dog beside him: "I taught my dog how to whistle."
Boy 2: "I don't hear him."
Boy 1: "I said I taught him, not that he learned it!"

It is through the *process* of transfer that understanding becomes evident, so if we are looking for evidence of transfer we will need to create a situation in which students are asked to actively use what they have learned in a new and problematic situation. **Performance assessments** — authentic, open-ended, and complex tasks — are designed for this purpose.

It is important to emphasize now that we should not regard performance assessment as "better than" other assessment methods. Tests, quizzes, and other "traditional" tools have their place: If the desired outcome is for students to memorize facts or data, a quiz is appropriate. If an informal group check for understanding is needed, posting a discussion question that targets the understanding may be sufficient. The "best" assessment method is the one that most appropriately gathers evidence respective of desired results — it is the "best tool for the job."

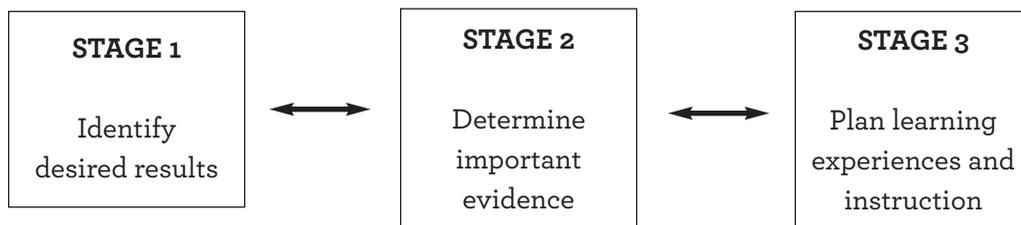## How Do Understanding by Design and "Backward Design" Support Understanding?

Developed by Grant Wiggins and Jay McTighe, Understanding by Design (UbD) is a method — not a program — to help you, the instructor, think logically and intelligently about what you want students to learn, how you will gather evidence of learning, and, finally, what lessons and activities will effectively lead students to that learning.

The design process is "backward" because it reverses the all-too-common teaching-centered approach to course development in which activities are selected first ("What lectures will I deliver?" "What will be the required readings?"), before goals and assessments are thoughtfully considered and carefully prioritized.

In the "backward design" process, the focus is learner-centered; your questions shift to "What do I want students to understand?" "What do I want them to be deeply curious about?" "How will I know they have truly understood?" In following this process, you will be better equipped to match "form" with "function" — putting your goals, assessments, and instruction directly in the service of what you, as an effective instructor, strive to achieve: students' deep understanding.

Three Design Stages of UbD

There are three stages in the backward design process of course development:

STAGE 1	STAGE 2	STAGE 3
Identify desired results	Determine important evidence	Plan learning experiences and instruction

Stage 1: Identify Desired Results

Just as a golfer selects the proper club only after considering the hole toward which he is aiming and a quarterback calls a certain play only after determining what is needed to achieve the next down, we cannot design or choose appropriate assessment methods without first having our "eye on the prize": specified learning goals.

Yet articulating and prioritizing clear learning goals is not so simple. *What are worthy and appropriate results? What are key desired learnings? What should students come away understanding, knowing, and being able to do? What big ideas can frame these objectives?* These are the questions assessors and curriculum designers ask themselves.

Stage 1 of the UbD framework helps us categorize different learning objectives within a complete course or program. Formal, long-term **Established Goals** (often state curriculum standards or program goals) are identified at the top of the frame, followed by **Enduring Understandings** (transferable goals that support deep understanding and require uncovering through inquiry) and finally content goals: **Knowledge** (terms, facts) and Skills (methods, procedures, techniques). Also included in Stage 1 are **Essential Questions,** which, while not objectives in and of themselves, help guide student thinking.

How can we prioritize what is important to teach? Big ideas and core tasks

Faced with a myriad of lessons and objectives within a given course, how can we prioritize our work within all-too-limited time for instruction and assessment? How can we be sure our students can build connections and make sense of what they are learning? How can we be sure they will know what really matters — the "so what?" — in what they are learning?
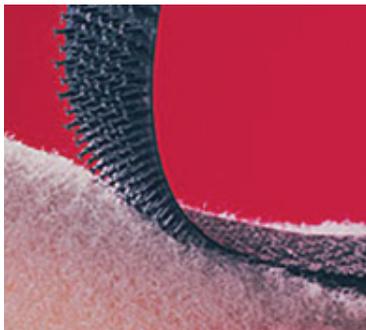
Big ideas, the core concepts and principles embedded in a unit, can help students and teachers alike keep an eye on what is most important. Wiggins and McTighe provide a useful analogy: Big ideas, a teacher noted, "serve as 'conceptual Velcro' — they help the facts and skills stick together and stick in our minds!" (p. 66)

Big ideas can take several forms. They can be themes ("the American Dream"), concepts ("systems," "change"), issues or debates ("creationism" vs. "evolution"), problems or challenges ("deforestation of the rain forest"), processes ("scientific method"), theories ("Theory of Relativity"), paradoxes ("poverty in the wealthiest nation in the world"), or assumptions ("We need to go back to the basics in education."). Whatever the form, big ideas are inherently abstract and thus require "uncoverage." They may be unpacked from the standards but are transferable to other contexts.

Identifying big ideas can be challenging. When you are considering the big ideas in your course or wondering if your students see the big ideas, here's a helpful question to ask: *If the unit is the story, what's the moral?*

In addition to using big ideas to help prioritize content, you can also sort learning goals into three broad categories: Worth Being Familiar With, Important to Know and Do, Big Ideas and Core Tasks. Recall the importance of matching assessment method to the type of evidence needed (i.e., performance tasks gather evidence of deep understanding, while a multiple choice quiz is appropriate for assessing factual knowledge). Prioritizing goals not only helps us determine how much time and effort we should spend on a particular goal, it also helps us identify appropriate assessment methods.

What does evidence of understanding look like? The six facets of understanding

What would students be saying and doing if they truly understood what they were learning? As assessors, we need to have a clear answer to this question in order to clarify goals and identify appropriate assessment tools. In the broadest sense, understanding is revealed through one's ability to transfer knowledge and skills. But because understanding is complex and multifaceted, Wiggins and McTighe go further to identify six ways in which transfer can manifest itself: The Six Facets of Understanding.

> *What would students be saying and doing if they truly understood what they were learning?*

Think about a time when you felt you really understood something. Perhaps it involved playing an instrument, participating in a sport, walking in another's shoes. Now consider how your experience fits into the Six Facets Model. When you truly understood, you most likely were able to do at least one of the following:

- Explain
- Interpret
- Apply
- Have perspective
- Empathize
- Have self-knowledge

It should be noted that all six facets do not have to be present in order to determine whether a student has achieved understanding. It is more important that the six facets require us to shift from a teacher-centered model of teaching and assessing to a learner-centered one. By considering the actions or processes students must do to demonstrate they truly "get it" (understanding as *doing*), you, the instructor, will be better equipped to provide focused instruction and valid assessment.

Essential questions and enduring understandings

We've all been there, haven't we? Sitting as a student in a lecture or workshop, listening to the speaker or eyeing an assignment, we suddenly ask ourselves: "What does this have to do with anything? I don't get the connection." Or perhaps as an instructor, you've had the sobering experience of having one of your students comment, "Why are we learning this? *So what?*"

As instructors, the challenge is to stay focused on the big ideas throughout the course while keeping our eyes — and those of our students — on the key understandings we are after. Two key components of Stage 1 provide this focus: essential questions and enduring understandings.

What makes essential questions "essential"?

Essential questions drive inquiry. They should spark curiosity and prompt students to uncover the relevance and meaning of a topic. They guide students to the desired understandings and may spark new questions, insights, or connections. Consider these essential questions:

> *Is there ever a "just" war?*
> *Can a fictional story be "true"?*
> *What makes for a great friend?*
> *To what extent are science and religion related?*

Right away, one senses the thought-provoking, philosophical nature of essential questions. What about them is "essential"? They are important questions that may recur throughout our lives. They target big ideas within disciplines and cannot be answered in a single sentence. Essential questions...

- Have no simple "right" answer; they are meant to be argued.
- Are designed to provoke and sustain student inquiry, while focusing learning and final performances.
- Often address the conceptual or philosophical foundations of a discipline.
- Raise other important questions.
- Naturally and appropriately recur.
- Stimulate vital, ongoing rethinking of big ideas, assumptions, and prior lessons.
(from Understanding by Design Professional Development Workbook, p. 91)

Wiggins and McTighe emphasize that, more than the wording, it is the intent of a question that makes it essential: "No question is inherently essential (or trivial, complex, or important). It all comes down to purpose, audience, and impact: What do you as a teacher-designer intend to have students do with the question? Is the goal lively inquiry or the recall of a single answer? *The goal must be robust and revealing inquiry, leading to deeper understandings and new questions.*" (p. 110, emphasis mine)

Wiggins and McTighe also distinguish between open and guiding questions. The former do not lead to a final answer at the conclusion of a unit but remain open to further investigation (and, perhaps, spur even more questions). Guiding questions eventually lead to specific understandings. Again, the authors suggest a balance of open and guiding questions within a course.

As assessors, how important is it that we include essential questions in our evaluation plan? During the design process, essential questions keep us focused on the understandings and prompt us to select or design assessments *up front* that target those understandings (that "backward design" process). Some designers find it easier to derive goals for understanding from essential questions. For example, the topical essential question "What do different versions of the Cinderella story reveal about culture and the story?" can lead to the understanding that "fairy tales and other folk literature capture universal patterns and recurrent aspects of the human condition."

Essential questions keep us focused on the understandings and prompt us to select or design assessments up front that target those understandings.

Essential questions can also be used as assessments in and of themselves. An instructor may ask his or her students to do an ungraded written response to an essential question, either before the course to assess prior knowledge or during the course as a formative assessment. Essential questions and desired understandings also serve as an important springboard for generating performance task ideas.

It is also important to note that essential questions are intended to be shared with students right from the onset of a course. Students should be aware of the questions framing their work, and the questions, once introduced, should be revisited throughout the course as focal points for lectures, discussions, and assignments.

Essential questions are challenging to write, even with the list of characteristics at hand. It is often helpful to start with your unit's big ideas. What questions come to mind as you consider them? Think, too, about the questions students might ask about the topic and the questions you would ask while teaching to spark curiosity and debate. Finally, what do you wonder about? Tap into your own curiosity about the topic. These may be questions to which you are still seeking answers.

Now, to complete our work in Stage 1, let us turn to enduring understandings:

What makes an understanding enduring?

Suze Orman, financial guru and author, prefaces each of the chapters in her book *Women & Money* with a reader's to-do list that begins: "I would be *thrilled* if you..." Understandings that would "thrill" you, and your students, are good ways to think about enduring understandings. Grant Wiggins also suggests that instructors imagine their students leaving the classroom — virtual or real — engaged in animated talk about an "aha" moment they just experienced: something that really got them to think differently, something they will remember long after the course is over. That "aha" is an enduring

understanding. Specifically, enduring understandings are:

- Important inferences, stated as generalizations (or "moral of the story").
- Transferable, with enduring value across subject areas.
- Abstract, counterintuitive, and easily misunderstood ideas.
- Attained best through inquiry, by "uncovering" and "doing."

Enduring understandings are synonymous with desired understandings. They describe what we want students to understand at the conclusion of the course. Unlike essential questions, which are made transparent to students, enduring understandings are meant for the instructor; they are intended to frame our goals. Evidence that students have achieved the desired understandings is not found in their ability to regurgitate the understandings statements. Evidence of achievement is determined through a carefully crafted performance assessment that aligns with the understandings.

Stage 2: Determine Important Evidence of Learning

Performance Assessment

Because we are using the "backward design" model, we will resist the temptation to think about lectures and assignments that will lead students to the "Desired Results" of Stage 1 and, instead, focus next on Assessment Evidence — Stage 2. This includes...

- o Culminating performance assessment that includes a performance task and accompanying scoring rubric.

- o Other evidence (formative assessments, tests, quizzes, observations, etc.).
- o Student self-assessments.

We will first focus on performance assessment. As our values about the purpose of education have evolved — focusing more on developing critical thinking skills and knowledge transfer and less on discreet facts and isolated skills — so has the need to develop assessment methods that match our purpose. Designed to elicit evidence of true understanding, performance assessment has garnered much attention as the "new kid" on the assessment block.

What is performance assessment?

A performance assessment seeks to obtain *evidence of understanding* by engaging students in one or more of the six facets of understanding: explain, interpret, apply, take perspective, empathize, and show self-knowledge. A performance assessment involves the use of a performance task — a challenge that requires the transfer of skills and knowledge acquired

in a course, one that often simulates or mirrors the issues and problems faced by experts in the field. While cognitively demanding, performance assessments vary greatly in their level of complexity but always target at least one enduring understanding of the course. In addition, the criteria by which students will be evaluated are "transparent." Students know right from the start how they will be evaluated and by what standards their product will be judged. Developing an informational brochure for clients, analyzing wiring drawings for a home, interpreting a collection of historical documents, or developing a professional development workshop are but a few examples of performance tasks.

How does one "think like an assessor" to select appropriate assessment methods?

Because understanding is continually being constructed and refined, gathering evidence of understanding within a course is an *ongoing* process, one that involves multiple assessment methods.

We must be careful not to consider those assessment methods that target higher-order thinking skills and knowledge transfer (academic prompts and performance tasks) to be "better" (i.e., more valid, more reliable, more reflective of "best practice") than those that are designed to assess factual knowledge or discrete skills (tests and quizzes). Traditional tests still have their place among the many assessment tools at our disposal. The "best" assessment is, simply, the one that is valid (gathers appropriate evidence in light of stated goals) and is reliable (accurate in its obtained score). A test in math computation may well be the "best" method of assessing calculation skills, while a multiple-choice quiz might be a "better" means of finding out students' understanding of a book's plot than an essay assignment would be.

The "best" assessment is, simply, the one that is valid (gathers appropriate evidence in light of stated goals) and is reliable.

If a learning goal is simply one with which students should be familiar ("Identify key figures who contributed to the civil rights movement"), traditional tests and quizzes would be appropriate. If a learning outcome is important for students to know and do ("Use Bloom's Taxonomy," "Describe how a bill becomes law"), both traditional assessment methods and performance tasks and projects could be used. Finally, if the goal is for students to understand the big ideas and enduring understandings of a unit ("Apply the habits of mind used by scientists to engage in inquiry," "Understand that true friendship endures through both good times and bad"), then performance tasks and projects are called for.

Designing a performance task

Designing an effective performance task that is clearly aligned with a course's desired

results can be challenging. We can begin crafting a task by looking first to the six facets of understanding — explanation, application, perspective, self-knowledge, empathy, interpretation. Recall that these are six ways through which understanding can be manifested. We can ask ourselves what a task that taps into a particular facet might look like. Be aware: You will not use ALL these facets in a single performance task! Indeed, understanding will most likely be sufficiently revealed by designing the task around a single facet. However, brainstorm a variety of ideas and challenge yourself to think broadly across all facets in order to generate several possibilities. You can find examples of tasks online at *http://www.jaymctighe.com.*

Once you have several ideas from which to choose, return to your desired results in Stage 1. Which of your task ideas best targets the essential questions and enduring understandings? (Another design note: Your performance task need not address ALL essential questions and enduring understandings, but should include what you consider the most important outcomes for the course and should provide for some synthesis of key ideas.) Which task seems most "doable" given time, resources, and your e-learning environment?

If your selected task involves a real-world scenario, it can be developed further using the GRASPS format. GRASPS is an acronym for Goal, Role, Audience, Situation, Performance (or Product), and Standards:

Goal: Your goal is to _____ (design, create, debate, etc.)
Role: You are/Your job is _____ (a curriculum developer; quality controller)
Audience: Your clients are/Your audience is _____ (adjunct faculty; radiology patients)
Situation: (the context of the task or problem)
Product/Performance: You will _____ (create a public service announcement; develop an action plan)
Standards/Criteria for Success: Your product/performance must be _____ (indicators of a successful project or performance)

By following this framework, you will be better ensured of developing a task that is not only authentic but also engaging and meaningful for students. Does every performance assessment need to follow this structure? No, but for those of us new to designing performance tasks, GRASPS is a useful design tool.

"Thinking is messy, and deep thinking is very messy," comments writer Alfie Kohn. Performance tasks, with their complex challenges, do require students to get "messy" — literally, perhaps, as they work on a project or performance, but certainly cognitively. A well-designed performance task should present students with something to grapple with and puzzle over, and the authentic nature of the assessment may mean that, just as in real life, the results of an experiment may mystify rather than clarify, or the data may be not arrive in neat and tidy numbers. It is in the "messiness" of tackling demanding problems that effective educators seek evidence of deep understanding.

How do we evaluate understanding?

Because performance tasks are complex and have more than a single correct answer, we must evaluate the performances or products with a set of **criteria**. Criteria highlight the most important parts of the students' work relative to the desired goals. A criterion for batting would be: Hit the ball with the bat to send the ball into the playing field. A criterion for solving math problems would be: Use efficient and accurate approaches to find a solution.

When we ask ourselves, "What are the criteria by which I will judge a student's level of understanding?" we must be sure that we identify the *most important* elements of the process or product that *align with our goals* for understanding, not just aspects that are most visible or easy to score. We must be particularly aware of this when deriving criteria for performance tasks that involve a product; criteria for creativity and attractiveness, for example, may readily come to mind, causing us to neglect less obvious but nonetheless critical criteria that will reveal true understanding.

For scoring purposes, criteria can be arranged graphically, either in a list (called a criterion-based performance list) or a rubric. A **rubric** is a scoring guide that allows both teachers (and students) to make judgments about students' work. It is very likely that you have used rubrics.

There are two basic types of rubrics: **analytic** and **holistic**. Analytic rubrics tend to be the most appropriate when assessing complex performance tasks, because analytic rubrics allow users to judge and score each identified trait separately, as opposed to giving a single (holistic) score that does not, in itself, identify specific areas in which the student's work met the desired standard or was deficient.

Creating rubrics for understanding: What should we look for and where should we look?

Wiggins and McTighe identify three key questions we, as assessors of understanding, must ask as we begin the process of creating a rubric:

1. *By what criteria should performance be judged and discriminated?*
2. *Where should we look and what should we look for to judge success?*
3. *How should the different levels of quality, proficiency, or understanding be described and distinguished from one another?*
   (p. 172, *Understanding by Design*)

We must look to two sources for identifying criteria: the desired results of Stage 1, of course, as well as samples of student work that illustrate the desired understandings. Reviewing and analyzing numerous samples of student work allows us to generate more detailed, accurate,

and appropriate criteria. If you are developing a rubric for a new course, you may not have work samples. Even if you must depend solely on the desired results from Stage 1 to initially generate criteria for your rubric, know that samples of student work should be used to revisit the criteria after using a rubric for the first time. Were the criteria aligned with the desired results? Were criteria omitted that were needed, or were some criteria too vague? These are questions you will ask yourself during the rubric design process, but remember: A rubric is not "done" until after it has been "road tested" at least once.

Once you have derived your criteria for assessing the performance task, you need to categorize them into *two general types*: criteria by which quality of *understanding* will be assessed and criteria by which the quality of *performance and/or product* will be assessed. For scoring purposes, understanding should be weighted more heavily than the performance or product (65% vs. 35%, for example). If our goal is to teach and assess for understanding, this imbalance makes sense.

To create a four-scale rubric (1 = little evidence of understanding; 2 = limited evidence of understanding; 3 = solid evidence of understanding; 4 = sophisticated level of understanding), start with criteria that describe the level of "solid understanding" (which would meet your desired goals for the task), then work up one level to "sophisticated thinking" and down two levels to "limited understanding" and "little understanding."

There is something of an art to articulating criteria: They must be general enough to enable users to evaluate performance standards or learning goals but must be sufficiently specific to provide useful feedback.

In addition to thinking about criteria in two broad types — understanding and performance — criteria for a performance goal can be categorized further: content, process, quality, and results. Here is an example for a basic writing task:

PERFORMANCE GOAL: Writing a Friendly Letter

	Quality of the Understanding	Quality of the Performance			
	Understanding	Content	Process	Quality	Results
TRAITS	Letter reflects warm conversational tone with intent to share and receive information.	Letter contains a greeting, news of mutual interest, and questions to addressee.	Letter is written in correct letter format.	Letter is written with a friendly "voice," with ample detail and clear interest in communicating with addressee.	Letter is pleasing to read and evokes a desire on the part of addressee to write in return.

Because rubrics for more complex tasks generally do not combine independent criteria, you will create two analytic rubrics for your performance task: one to evaluate the **quality of understanding** and the other to evaluate **quality of the performance.**

If you have used rubrics, either as a student or as an instructor, you could no doubt list some ways this evaluation method has been helpful to you. Perhaps, as an instructor, you have enjoyed the ease of scoring with a rubric, or liked the clarity of feedback rubrics offer. If you were given a scoring rubric as a student, maybe you appreciated knowing the expectations for quality performance up front; the rubric demystified the requirements for "A" work.

Validity

Thinking like an assessor requires us to consider the validity and reliability of an assessment. Validity requires us to ask: Does the assessment provide us with evidence that will enable us to arrive at accurate conclusions about what students have learned? Whether or not an assessment provides valid information can depend on a number of factors, including:

- Criteria: If the rubrics by which we are evaluating student performance contain criteria that are not aligned with desired goals or if the criteria do not reflect the traits of valid exemplars (student work), the inferences we make about student learning will not be valid.

- Bias: If an assessment contains language, contextual situations, procedures, or other elements that put one group of students at an advantage over another, the test results may be invalid.

- Usage: A multiple choice test may be a method by which to gather valid data on a student's ability to recall key dates in American history, but it may not allow a teacher to draw accurate conclusions about how that student is able to consider different perspectives on American colonization.

When it comes to the validity of conclusions drawn from performance assessments, the backward design process requires us to carefully consider whether our performance task will elicit evidence of true understanding. Wiggins and McTighe have created a simple two-question validity test:*

Could the task be performed well without understanding?

Could the task be performed poorly in spite of understanding?

If the answer to either of those questions is "yes," then validity is at risk. Sometimes it is in the process of deriving criteria and developing a rubric that one gains clarity around these two questions.

Reliability

We require an assessment to provide valid results. It must also be **reliable**. Reliability addresses the need for *consistency in response patterns*. If the assessment were given repeatedly to the same student (theoretically), would the score remain constant? Certainly, no assessment is 100% reliable. Because reliability is not fully attainable for any given method, it is important that instructors use a variety of assessment methods to obtain a scrapbook — not snapshot — of student learning. Consider assessing the same content in different ways: For example, one might assess what students know about the five-paragraph essay structure by having them write a five-paragraph essay, but one could also quiz them on the components of an essay with a multiple-choice quiz.

Because reliability is not fully attainable for any given method, it is important that instructors use a variety of assessment methods.

Formative assessment: purpose and goals

Who among us hasn't experienced that same feeling when the results of a realized goal – a renovated kitchen, perhaps, or a dream vacation, or that "perfect" job — didn't match what we had originally envisioned? This gap between vision and reality happens in our teaching — and more often than we'd like to admit. Indeed, the fact that we are setting learning goals at all — our "vision" for learning and achievement based on high standards — and pre-assessing implies an initial and often substantial gap between where we want students to be and where they are presently.

What we may fail to do is monitor that gap closely and continually *throughout* a course and adjust our teaching in response. We may look at the work students are doing and express frustration that our students aren't "getting it"…yet continue to plow unabashedly through the textbook or series of lectures in the interest of "coverage." But as professionals charged with "causing learning," we cannot afford to look the other way because we need to "get through the book" or take it personally when students don't give us "what we want." The act of learning and constructing deep understanding, as we mentioned, is "messy." We need to be willing to look at that messy evidence of "reality" squarely — and frequently — in the face: How are my students performing presently in light of the vision for learning, and how can I adjust my teaching to help them achieve that vision? We need to assess *formatively*.

What do you think is the most important factor impacting student achievement? Highly skilled teachers? Well-designed curriculum? High standards? Ample resources? Motivated students? Arguably, all these aspects, and more, play a role in how effective teachers can be in helping students learn and achieve. While a "guaranteed and viable curriculum is the #1 school-level factor impacting student achievement" (Marzano, *What Works in Schools*), the effective use of formative assessment methods is #2.

Recall that assessment is **formative** when it gathers information in an ongoing manner throughout a unit or course of study. The goal of formative assessment is simple yet powerful: to gather evidence about the vision-reality gap in order to effect change. Sports team coaches do this all the time. They have a clear vision of the performance goal: successfully playing against another team. They assess formatively each and every practice session as they observe players' skills. Given what they are seeing, the coaches may change the way they are coaching. They will also immediately give feedback to players ("This is what I see you doing." "This is what I don't see."), and they model ("Watch me carefully") and guide ("Next time, do this...").

It is the dual-purpose nature of formative assessment that makes it such a powerful tool for improving student learning. When used effectively, formative assessment methods 1) evaluate student progress and give students **feedback** as they work toward the final, demanding performance task, and 2) determine where the teacher needs to **adjust instruction** in light of results. In their landmark article "Inside the Black Box," Black and William provide ample evidence that "strengthening the practice of formative assessment produces significant and often substantial learning gains" – and this claim holds true from K-16, across disciplines, and even among different nationalities.

The role of feedback to improve learning

If the "game" is the performance task, how do we "coach" students about how well they are doing as they work toward that performance? How do instructors create an exemplary feedback system?

Consider a time when you received quality feedback. Perhaps you played on a sports team or were a student in the performing arts. What was it about that feedback that enabled you to improve your performance? Before reading the characteristics of effective feedback developed by a group of teachers, come up with some traits from your own experience, then compare.

Notice the interdependent nature of feedback and formative assessment when comparing the above characteristics with the characteristics of good formative assessment as outlined by Wiggins and McTighe (On *Assessment for Learning,* Authentic Education, 2006):

We now need to reflect on our teaching and ask ourselves whether we have a quality feedback system in place. How often and how well are we providing feedback? Do we use models of exemplary work or performance so students are clear about their learning goals? An often overlooked component of a good feedback system is time: Are we allowing enough time for students to use the feedback (as well as their own self-assessment results) to adjust and practice?

Stage 3: The Learning Plan

So far, we have introduced two of the three stages in the backward design process: **Stage 1** (Desired Results) and **Stage 2** (Determining Important Evidence) and have considered the importance of formative (ongoing) assessment in helping close the learning gap. And so we arrive at **Stage 3**, The Learning Plan. For those instructors who love the creative process of developing lectures and assignments — digging through books, websites, videos, and other resources to create meaningful learning experiences — your time has finally come! Well, not quite yet. The logic of backward design tells us to resist the urge to jump right to lecture and lesson planning and, once again, train our eye on assessment. Specifically, we will consider the formative assessment methods we will use throughout the unit.

Here's an approach that you might find helpful. Wiggins and McTighe suggest that designers first create a grid something like the one below for placing the different assessment steps of the course in sequence: (Note: This is **not** intended as a calendar!)

Step 1: Diagnostic Assessment	Step 2	Step 3	Step 4:
Step 5	Step 6:	Step 7:	Step 8:
Step 9:	Step 10:	Step 11:	Step 12:
Step 13:	Step 14:	Step 15:	Step 16:
Step 17:	Step 18:	Step 19:	Step 20:
Step 21:	Step 22: Summative Assessment (i.e., Performance Task)		

The gray boxes are reserved for formative assessments. Where do you think these additional assessments might go on the grid given the purpose of each? Here is an example of a grid "in progress":

Step 1: Diagnostic Assessment	Step 2: nongraded discussion	Step 3: homework	Step 4: homework
Step 5	Step 6: quiz 1	Step 7: homework	Step 8:
Step 9: journal prompt	Step 10:	Step 11:	Step 12:
Step 13:	Step 14:	Step 15:	Step 16:
Step 17:	Step 18: skills test	Step 19:	Step 20:
Step 21:	Step 22: Summative Assessment (i.e., Performance Task)		

Once some formative assessments are in place, ask yourself: *What learning needs to happen between these assessments so that students are equipped and prepared for each assessment?* Although you may not know all the different formative assessment strategies you may use throughout the course, completing this grid with "other evidence of learning" will put you in a much better position to create relevant, focused learning activities and lectures.

SAMPLE ASSESSMENT RUBRIC

Factor	Wt	90 - 100%	80 - 89%	70 - 79%	0 - 69%
Application of material	25%	**Excellent** application of seminar material to the topic.	**Above-average** application of seminar material to the topic.	**Adequate** application of material to the topic, but missed some important points.	**Missed most important** points on the topic.
Analysis	25%	**Exceptional** level of critical thinking; mature and/or creative analysis.	**Above-average** analysis/insight into issues and questions.	**Adequate** analysis/insight into issues and questions.	**Shallow, little or no analysis.**
Effective Use of Language and Grammar	25%	**Highly readable.** Professional, jargon-free language; Very few to no spelling and grammar errors. Well-crafted, on-topic paragraphs	**Professional language meets audience needs** Some wordiness or jargon. Some, but not many, grammar or spelling errors Most paragraphs well-structured and on topic.	Several awkward or wordy sentences; over-reliance on jargon. Numerous grammar or spelling errors. Long and sometimes rambling paragraphs.	**Obvious need for review** of spelling and grammar rules. Many wordy or awkward or unfocused sentences. Paragraphs are a collection of sentences and do not center on a single topic.
Composition	25%	**Clear, logical structure** that easy to follow.	**Generally clear** and easy to follow, with some areas in need of clarification.	Progression of ideas is **difficult** to follow	**Very difficult** to follow the writer's thoughts.

CATEGORIES

Application of Material
- Articulates principles and essential facts in clear, jargon-free language.
- Applies principles and essential facts to issues, questions, and theories that arise in expected situations/activities.
- Applies principles and essential facts to issues, questions, and theories that arise in novel or unexpected situations/activities.

Analysis
- Clearly identifies issues and makes clear and persuasive statements about them.
- Demonstrates why an issue, a fact, or information is relevant.
- Examines arguments and counterarguments (pro and con positions).
- Explores alternatives and their consequences.

Effective Use of Grammar and Language
- Active voice, to-the-point sentences, and "professional" language (as opposed to casual, oratorical, or "preaching") keep the reader's attention on the paper's major points.
- Vocabulary is audience- and issue-specific.
- Each paragraph focuses on a single idea or point; paragraphs should be in a logical, sensible sequence that advances the paper's theme.

Composition
- Clearly stated topic keeps facts, information, and analysis focused.
- Clearly identified points and logical, progressive presentation gives the reader a clear vision into the paper's substance and does not make the reader dig for meaning.
- Prioritized issues, facts, and materials make the paper relevant to the reading audience.
- Section headings lead the reader from topic to topic.

GRADING FOR PERFORMANCE

One final thought about the purpose of grading. Many college instructors hold the "apple sorting" vision of grading as a simple measurement process, a means of distinguishing the good applies from the bad apples. But unlike apple sorting, the ultimate purpose of grading is to get students to improve their performance — to turn the bad apples into good apples. That is not going to happen if the bad apples are simply thrown into a barrel and forgotten. But this is exactly what happens when students are given grades with no follow-up. The system encourages students to skip to the back of a returned assignment to read the grade and then file it away, ignoring all the commentary. Even if the student reads the

commentary, if he or she is not forced to act on it, the commentary will do little to improve performance.

One well-known college instructor provides a perfect illustration of how grading can be used to directly improve performance. He was known as the toughest grader at his college, and yet also the best teacher. When a colleague asked how many As he gave in his class, the instructor replied that "everyone gets an A." Naturally, the colleague wondered how he could be the toughest instructor at the school if everyone gets an A. He replied that "I only accept A work. Students have to rewrite their work over and over until it is A quality. Then I accept it."

We often assume that the lower the class grades, the stricter the standards and the better the instruction. But, of course, students could be getting low grades because they are not learning anything. Here we have an example of students getting high grades in a strict grading environment. This example challenges our assumptions about grading and demonstrates that it can be used as a tool to improve student performance — to take them from C work to A work. After all, isn't improving student performance what teaching is all about?

RESOURCES

Authentic Education
http://www.grantwiggins.org/ubd/ubd.lasso
The website for Understanding by Design, the leader in educational assessment.

Understanding Rubrics
www.middleweb.com/rubricsHG.html
Heidi Andrade's excellent refresher on the basics of using rubrics.

Discovery Education
http://school.discoveryeducation.com/schrockguide/assess.html#rubrics
Kathy Shrock's comprehensive resource of rubric samples.

Online Assessment Strategies: A Primer
http://jolt.merlot.org/vol6no1/sewell_0310.htm
A short article by Sewell, Frith, and Colvin that lays out the connection between learning objectives, teaching methods, and assessment techniques.

No Grading, More Learning
http://www.insidehighered.com/news/2010/05/03/grading
Cathy Davidson's controversial experiment in transferring grading to the students.

② Part Two: Assessment in an Online Environment

The principles of sound assessment are the same regardless of whether one is teaching face to face or online:

— Assessments are directly aligned to clear learning goals.

— A variety of assessment methods are used, ranging from informal assessments such as discussion dialogues and reflective journals to traditional tests and quizzes and, at the most complex level, open-ended academic prompts and performance tasks.

— The instructor has implemented diagnostic, formative, and summative assessment strategies in order to measure progress over the course of instruction.

— Learning goals and performance criteria are transparent to students through the use of essential questions and scoring rubrics.

— The instructor provides students with ongoing feedback based on formative assessment results to help close the learning gap.

— Students are given an opportunity to reflect on and self-assess their learning.

However, online learning presents both challenges and opportunities for assessment.

Challenges
• New federal guidelines require methods for authenticating learning in an online environment. This will most likely be done by proctoring test takers, with either on-site proctors or camera equipment that monitors students as they take exams.

• Online instructors must get used to providing digital feedback on assignments rather than handwritten "marginalia." In the next module, we will learn about technologies that both save time and increase the amount of feedback given to students.

Opportunities
• Discussion takes a new form as an assessment tool. In-class discussion is used sparingly as an assessment tool in face-to-face courses. Instructors might provide a single "participation grade" for students at the end of the course, based on level of discussion. This is used mostly to keep student's attention.

But online courses allow for much more detailed assessment of discussion. For one, students can, and should, be required to post a certain number of discussion comments each week, which are graded according to rubrics similar to those used for formal assignments. This

allows for online **formative assessment** of student learning that tracks how well the class, as well as individual students, grasps the subject matter.

• Two, because online discussion has fewer limits than face-to-face instruction, students can be given **performance tasks** in an online discussion to better measure comprehension. For instance, if one goal of a class is to cultivate students' ability to evaluate and make recommendations on issues they may encounter in the workplace, discussion questions can provide hypothetical situations and require students to analyze those situations and provide solutions.

Authenticating Online Learners

The reauthorization of the Higher Education Act in 2008 requires regional accrediting agencies to create guidelines to ensure that the student who received credit for a course is the same student who did the work. This is in response to the perceived ease of using a proxy to take tests in an online environment.

Of course, someone could just as easily have a proxy take their classes for them in a face-to-face environment — nobody asks for identification at the door to a face-to-face classroom — and there are no statistics demonstrating that the use of proxies is more common in an online classroom than in a face-to-face classroom. Nevertheless, schools are now under pressure to authenticate online learners.

One solution to the authentication issue is to require test takers to use a proctor. There are professional proctoring services, and many librarians will also proctor an exam. But because students may not be in a position where these services are convenient, many scholars are turning to authentication technology.

The most common technology is a 360-degree webcam that provides constant surveillance of the test taker and the surroundings to ensure that no notes are being used. These devices can also come with a fingerprint scanner for use before taking the test, though this presents the problem of how to originally authenticate the fingerprint.

It is important to keep in mind that the technology itself cannot detect cheating — it can only provide a view of the user. Somebody must watch the users, either in real time or later on video, in order to ensure that no cheating has occurred. With a large class, this can add up to quite a bit of monitoring time. Thus, some companies, such as Software Secure, offer both the webcam and an optional monitoring service that uses their staff members to view videotapes at an hourly rate. Even so, these services will only flag suspicious behavior — it is up to someone at the school to review the video and decide if the actions merit response.

Text Feedback

Lacking the ability to scribble handwritten comments on the margins of students' papers, most online instructors use the editing functions within their word processing program to provide students with feedback. Here are some important tips to using digital feedback:

- Always save the edited version under a new filename to preserve both the original and edited version in case there are questions about them in the future.

- Use the callout "commentary" boxes to add comments.

- Avoid using "track changes" to correct writing errors. It is too easy for the student to simply hit "accept changes" without reviewing the comments. Instead, use the commentary feature and indicate "spelling, grammar, awkward," and then require students to figure out the error themselves.

Voice Feedback

In an online environment, instructors generally employ the same text feedback method that they used to put comments on paper assignments. But a digital environment allows for a range of feedback types, including voice, video, links, etc.

Voice feedback in particular can be a powerful way to enhance student learning. Phil Ice has done extensive studies comparing the effects of voice feedback versus text feedback on student learning, and his findings are striking. Students report a variety of benefits of voice feedback over text feedback:

- **Improved ability to understand nuance:** Students indicated that they were better able to understand the instructor's intent. Students also indicated that instructor encouragement and emphasis were clearer.

- **Increased involvement:** Students felt less isolated in the online environment and were more motivated to participate when they heard their instructor's voice.

- **Increased content retention:** Students reported that they retained audio feedback better than text feedback. Interestingly, they also reported that they retained the course content **to which** the feedback was related better than with text feedback. These self-reported findings were supported by the fact that students incorporated into their final projects three times as much audio feedback as text feedback.

- **Increased instructor caring:** Students interpreted the instructor as caring about them and their work more when they received audio feedback over text feedback.

This difference was due to audio feedback coming across as more personal than text feedback.

Not only does audio feedback improve learning and engagement with an online course, but it also saves instructors time. Instructors reported spending an average of 13.43 minutes per assignment providing text feedback, and only 3.81 minutes per assignment on voice feedback. Yet the average number of words used was 129.75 with text feedback and 331.39 words with audio feedback. In other words, instructors provided more feedback in less time with audio feedback. This is due to the simple fact that we can talk faster than we type and we don't have to worry about spelling.

Moreover, it was found that instructors used five times as many adjectives with audio feedback as with text feedback. The use of adjectives generally indicates more expressive language, and it is possible that this expressiveness contributes to personalization of the feedback.

Voice feedback is very easy to add to any text document. Just open the document in any word processer, such as Microsoft Word, and insert a sound file. The processer opens a dialog box that allows the user to record directly into the file with a microphone.

Ice recommends not worrying about editing out the "ums" and other terms that we add to our spoken language. These little pauses do not distract the listener and they help humanize the message. He also recommends still using text for one- or two-word feedback, like "grammar" or "good," as sound files with just a couple of words are disconcerting.
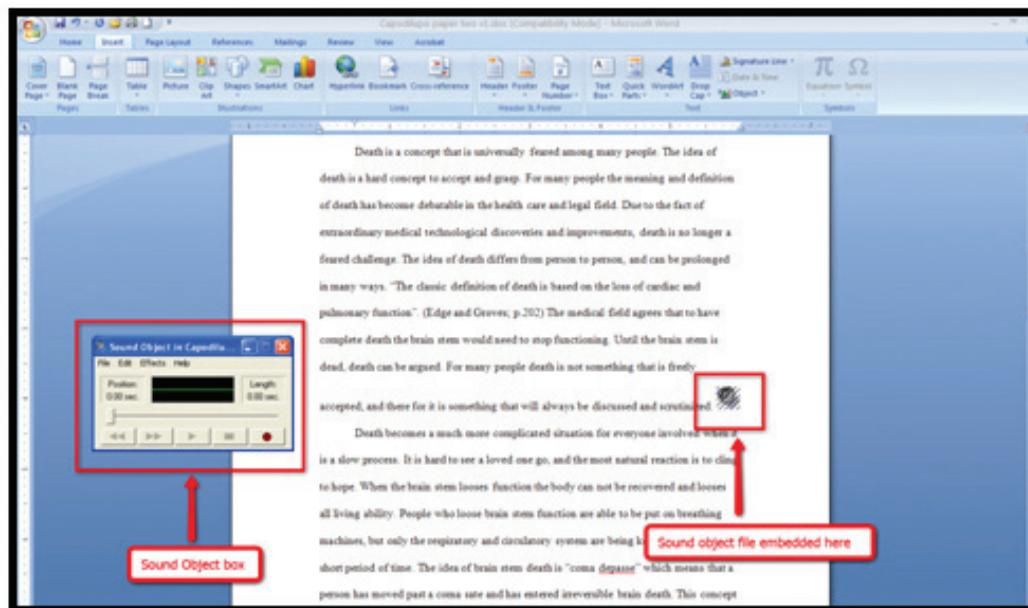
Online Discussion

The Challenge of Discussion
Arguably the biggest challenge of online teaching is learning how to craft good discussion questions. Discussion should carry the course topics beyond the material, often by mining out more general issues that underlie course topics. Good questions also provide an opportunity for original insight and for students to learn from one another.

Yet new instructors tend to make certain standard errors in developing their discussion questions:

Mini-essays: The most common error is to confuse a discussion question with an essay question. Essay questions are meant to assess comprehension of the topic and mostly just feed back what is covered in class — they do not invite discussion. For instance, "What are the three elements of Plato's Allegory of the Cave?" asks for specific information. Each student will provide more or less the same response, and thus there is no room for back-and-forth discussion. A better discussion question would be "What does Plato's Allegory of the Cave mean for modern education?"

Obvious response: Online discussion questions often are written to solicit an obvious response. This does not lead to new, or higher, thinking. For instance, "Is hacking into a computer system wrong?" does not invite widespread disagreement, as few are willing to defend the practice. Students will simply provide original ways to repeat what someone else says. A better discussion question would be "Imagine that a 15-year-old boy dies in a car accident. Would it be acceptable for his parents to hack into his Facebook account to learn about his correspondence with others?" This question invites reasonable positions on both sides of the issue and can lead in a variety of directions concerning privacy, parental rights, etc.

Personal response: Discussion questions should not generally ask students to describe how the course topic applies to their own situation. For one, they may consider that information private. But, more important, a personal account does not invite a lot of discussion. For instance, "Who makes the IT decisions at your organization?" just produces a variety of pieces of information. Students will not be able to disagree with one another. A better question would be "Where should the IT function fit within an organization – facilities, finance, customer service, elsewhere?" Students can provide information on their own situation if they want to in order to critique or defend it, but this information is just a starting point to move to wider issues.

Remember, a discussion question should lead beyond the immediate course material, often by initiating debate and ideally by gaining an understanding of the underlying issues that make the material relevant.

Online Discussion Assessment

Online discussion provides at least two advantages over face-to-face discussion. One, because online discussion is asynchronous, students can devote far greater thought time to their comments. They can spend time considering other's comments and crafting their own replies. Online discussion also brings out those who normally would not contribute, due to their fear of public speaking. Finally, visual audience cues such as looking away, yawning, or speaking to others conveys disinterest and can cause a speaker to cut short his or her commentary in a face-to-face environment. The instructor can expect far greater, and deeper, discussion in an online environment than in a face-to-face environment.

Two, the physical setup of most face-to-face classrooms discourages discussion. Students sit facing the instructor rather than one another, creating the implied expectation of passivity on the part of the student. All discussion generally goes to and from the instructor, who even in the best of circumstances acts as a kind of traffic cop catching and deflecting comments back into the audience. Students rarely speak directly to one another, partly because their K-12 conditioning teaches them that speaking to one another is disrespectful to the instructor and will get them scolded.

But without a physical space to the classroom, everyone is on equal footing. The threaded discussion format allows students to speak directly to one another. In fact, the center of gravity of the class tends to move from the lecture to the discussion and thus out into the audience in an online classroom. Instructors should take advantage of this move by expecting students to reply directly to one another.

Online instructors are encouraged to use two main components in their assessment of discussion: original thought and interaction with others.

Online instructors are encouraged to use two main components in their assessment of discussion: original thought and interaction with others. Discussion questions are generally prestocked by the instructor, with two or three per week. Students can be expected to post an original in-depth response to the question and then a number of responses to others.

Original postings

The original postings are generally longer than responses to other postings, since they should demonstrate an understanding of the question's topic. At the same time, the evaluation should not tilt discussion too far toward an essay response. Most important is the distinction between original thought and research. Research can be expected of essays or paper assignments, but discussion should draw out the student's own views. Too many instructors make the mistake of requiring references to outside material in discussion questions. This practice turns the questions into mini-essays. We do not expect friends to cite their sources when they lend their view on a topic in a

coffeehouse. While students should be required to cite outside sources when they use them, they should not be required to use outside sources. Again, the goal is to generate original thinking, not research.

Some of the criteria that are often used to grade an original posting:

- **Completeness:** The posting demonstrates an understanding of the range of the question.

- **Depth:** The posting should move beyond a surface understanding to demonstrate comprehension on a deeper level.

- **Originality:** The best discussion is one that carries the students into areas not covered in the course material. Original postings are the drivers of new insights.

Replies

Replies to others can be much shorter than original postings, partly because they are more focused. However, postings such as "good point" should be allowed because they build student's confidence, motivation, and connection to one another, but they should not count toward the student's grade. Responses must carry the discussion forward. A good posting can be as short as a paragraph as long as it contains a new thought. As with original postings, creativity and depth can count toward the grade, but that creativity and depth can be spread over a variety of postings. Also, the general level of **activity** is important in discussion, meaning that a number of short postings can count as much, or even more, than a few longer postings.

Students should also be encouraged to recommend outside resources related to the discussion topic. This is different from citing sources for research purposes. Recommending outside resources allows students to add to the course content (and can be a valuable source for optional readings) and thus feel like co-investigators and co-content developers. It also gets them looking around for articles related to the topic, which will expand their knowledge base and understanding of the resources in the field.

Video and Voice Commentary for Discussion

As noted earlier, voice feedback is a powerful tool for connecting students to a class and improving comprehension of the instructor's intent. This applies to discussion as well. Course Management Systems allow for discussion postings in a variety of formats, including sound and video, yet few instructors or students take advantage of these opportunities.

One way for instructors to set an example for students is to post a voice or video wrap-up of the discussion after all postings are in. These wrap-ups also serve the purpose of helping balance the goals of active instructor participation with monopolizing discussion. Students want to see the

instructor involved in discussion as evidence that he or she values the student's comments, yet the instructor should not monopolize discussion by posting too often.

Voice feedback is a powerful tool for connecting students to a class and improving comprehension of the instructor's intent.

A good solution is to record a four-to-five-minute sound or video commentary at the end of each discussion that provides the instructor's thoughts on the overall themes of the discussion. This is an opportunity to do "shout-outs" to students who make particularly thought-provoking points. At the same time the sound or video format can break the monotony of reading text for discussion. Plus, the fact that we tend to use more expressive and informal language in our spoken communication over written communication provides a nice counterbalance to the often formal text discussions.

Anything that humanizes the discussion or breaks the textual monotony will encourage greater participation and enthusiasm. There is no need to worry about production values in creating these recordings. The lighting does not have to be perfect, and, like voice feedback on assignments, there is no need to edit out to "ums" and other comments. They can be shot at home or in the office with a quality webcam. It is important to avoid the common mistake of looking at the keyboard rather than the camera. Instructors should simply talk to the camera and provide their thoughts. Looking away briefly, rolling eyes, and other facial expressions go a long way toward adding interest to the subject. These are very fun to make and a benefit to all involved.

Video discussion

One fun way to draw students into video discussions is through video interviews. Systems such as **Wetoku** allow people to interview others via webcam, with the screen split in half so that both webcams play at once. The instructor can interview the student on his or her views of the week's discussion or particular points made during discussion. The recording is saved on the Wetoku site and a simple link is placed within the discussion post, or the recording can be downloaded and put directly into the classroom.

Another alternative is to host a live video discussion. **Vokle** allows you to set up a kind of video radio show, whereby the organizer's webcam is streamed live to the audience and audience members can respond with chat. Someone can even call in on his or her own webcam to do a double video chat, similar to Wetoku. This can be a fun way to host live events for your class.

Optimizing Feedback in Online Courses: An Overview of Strategies and Research
Conference proceedings of "eLearning and Software for Education" (Conference proceedings of "eLearning and Software for Education"), issue: 01/2009, pages 181-186, on www.ceeol.com.
Phil Ice provides a good overview of his work on voice feedback.

Audacity
http://audacity.sourceforge.net/download/
Audacity is a free audio software platform that is ideal for recording and editing voice comments. A good source for tutorials on how to use Audacity can be found at
http://www.how-to-podcast-tutorial.com/17-audacity-tutorial.htm.

Wetoku
http://wetoku.com/
Record a video interview with someone else. The two speakers are put side by side on the same screen.

Vokle
http://www.vokle.com/
A fun system that allows users to host a video radio show.

Part Three: Assessment in an eLearning 2.0 Environment

The New World of Social Media

Social media has fundamentally transformed the Internet and how we communicate. Web 1.0 was based on static web pages designed by professional Web editors pushing out content to a public. Despite the appearance of an information revolution, the Web adopted the same model used by all mass media – a few speaking to many. All past revolutions in communication followed this model. The printing press, telephone, movies, and television allow for an individual or company to broadcast to other individuals or the many.

But social media fundamentally changed the entire communication paradigm. Now anybody can post content to the Internet, not just the professional Web editors. The content of social media sites is provided by the user, with the system only providing the means for individuals to enter content and communicate with one another. Facebook is a perfect example, where the content is entered by its users. YouTube, blogs, wikis, VoiceThread, and a myriad of other applications — most free — follow suit by providing only the structure for communication; the users provide the content.

Instructors have come to see the learning management system's limitations concerning the teaching end of teaching.

With no real limit to the number of connections that can be made, for the first time ever many can communicate with many. There are ordinary individuals making a living by posting homemade videos to their YouTube channels with millions of subscribers. Literally anyone with Internet access anywhere in the world can potentially broadcast to more people than any of the top television networks. In this new world of democratized communication, the audience is determined by the ability to generate interest in the message, rather than money or broadcast rights.

Social media is not restricted to personal or entertainment activities; it is a powerful new force in commerce, government, and education. Twitter can become one of the major channels for broadcasting professional communication and important news. Social media has become a critical component of emergency response, being used to harness the collective intelligence of the populace to inform decisions and save lives. Google has demonstrated the transformation in marketing by generating over $27 billion in revenue with almost no traditional marketing at all.

Social media has also transformed online education. Until recently, the instructor who wanted to teach partly or wholly online was stuck using the learning management system, a comprehensive platform like Moodle or Blackboard that manages all aspects of the class. While still serving a purpose in managing the back-end administrative tasks such as gradebooks and registration, instructors have come to see the learning management system's limitations concerning the teaching end of teaching.

For one, the learning management system preserved the closed classroom that sequestered the student from the public and his or her intended profession. But there is no reason why college students need to be "protected" from the public, as if they are living in cages and not already engaged with the public, especially through social media. Like anyone, students have much to learn from other students, instructors, the public, and practitioners in their profession. Social media fosters engagement and feedback through widened interaction that broadens the educational experience.

Two, the learning management system preserved the same "transfer of knowledge" model of learning that attempts to "push" content from instructor to student, like transferring water between vessels. Ironically, this model violates a large body of educational studies proving that knowledge is constructed by the learner by connecting with prior experience and interaction with others. Though the learning management system did introduce the flattened discussion that allowed more engagement within the classroom, that discussion is still tightly bounded by preloaded questions, format requirements, and grading standards that tend to channel it in specific directions. More important, students have almost no input into the class content, which is fixed by permission restrictions. The model provides little opportunity to "pull" content from the students. Social media turns this arrow around by allowing students to become content creators who learn by contributing to the shared development of the course itself.

The new range of activities opened up by eLearning 2.0 requires a look at how the tools of eLearning 2.0 can be used for assessment. In general, eLearning 2.0 differs from face-to-face and traditional online learning in being more open, collaborative, personal, and constructivist. We will explore how assessment works in these environments.

RESOURCES

Teaching in Social and Technological Networks
George Seimens explores how the role of the teacher could change in the future as students become producers of course content.
http://www.connectivism.ca/?p=220

From E-Learning to Social Learning
An excellent slideshow from Jane Hart on the transition to social learning.
http://www.slideshare.net/janehart/from-elearning-to-social-learning

The Neuroscience of Learning
A good webinar by Charles Fadel that grounds eLearning 2.0 in the science of how we learn.
http://www.learncentral.org/event/90712

Blogs

Blogging is a very easy way to add more personalized interactivity to either an online or face-to-face class. Systems such as Blogger, a Google application, allow students and instructors to set up their own blogs for free and subscribe to each others' blogs through RSS feeds. If an instructor would prefer to have more control over the students' blog or set up blogs for each student, systems like WordPress or Emundo allow instructors to set up blogs for an entire class. Finally, instructors who want to embed blogs into a wider learning environment or connect them directly to administrative functions such as grading, can use a social media-based education platform like Drupal. This free, open-source system provides the flexibility of putting certain activities outside of the password protection and making student blogging the center of a class, rather than the content.

The term "blog" is shorthand for "web log." Blogs originated as a way for individuals to post short snippets about their life for others to follow or comment on, but they evolved into much more. Today there are over 200 million blogs, most on specific topics, and they can host videos, links, and a variety of other "widgets." Some think that this evolution betrays the fundamental nature of blogs (*http://weblogg-ed.com/2004/05/05/#a1777*), but the functionality opens a host of new doors to assessment. For instance:

Papers

David Wiley at Brigham Young University had his students post their written work to a blog before handing it in. The students received comments from other students and even faculty at other institutions, which improved their work greatly. Wiley found that dozens of other people were effectively doing his job for him by providing students with commentary to improve the students' work. It improved student outcomes without extra effort on his part. (*http://chronicle.com/blogPost/David-Wiley-Open-Teaching/7271*)

Wiley is taking advantage of the open nature of blogs. While blogs are not ideal for editing written work, since comments can only be gathered together at the end rather than embedded into the work itself, the open nature of blogs invites commentary from others. While faculty understand that working a paper up to publication quality requires commentary from others, they often forget this principle when requiring students to develop work on their own. Blogs can be used to ingrain into students the value of soliciting commentary from others and incorporating that commentary into their works without plagiarism. They are a good way to develop collaboration skills and improve student work through revision.

Group Assignments

The University of Maryland, Baltimore County found that when they switched chemistry

labs from individual students doing experiments and submitting their results to groups of students posting their findings to a blog and receiving feedback from other students, the average passing rate in class went from 71.2% to 85.6%, even as the minimum score needed to pass went up. (*http://www.insidehighered.com/news/2009/10/02/chemistry*)

Once again, the public nature of the postings improves students' work, as we put more care into our public work than into work that will be seen only by the instructor, which is one of the main advantages to using social media in education.

Another option is to put students into small groups of three or four and assign each group a hypothetical or real case study related to class content. The group is to come up with a collective position on the case study – it might be resolving a problem – and post the result on a blog. Then each group is assigned to evaluate another group's position. This exercise teaches collaboration and group work, since the groups must come to a consensus on a decision. It is a valuable skill to develop when entering into a profession where group decisions must be made, such as a healthcare team's decision concerning whether to terminate treatment and switch to comfort care when the patient's condition is arguably hopeless. The results can be used to both develop and assess collaboration skills.

Discussion

A third way to use blogs is to extend discussion in a face-to-face classroom or as an alternative to threaded discussion in an online classroom. An instructor can post case studies to a class blog after every face-to-face class and have students comment on them. This is a much simpler way of running discussion than through a learning management system that requires log-ins and structured postings.

Blogs can also be used as an alternative to threaded discussion in an online classroom. While treaded discussions are topic-centered, blogs are person-centered. The result is much more expressive and personal commentary. Threaded discussion postings tend to get blended into the discussion, while blog postings are always attached to the poster. Students are more likely to develop an extended position or worldview on the material tying together their postings in a blog format. Thus, blogs can be used to assess student development over time rather than contributions to discrete topics. A student blog can be assessed as a whole, including coherence and formulation of a position. In general, blogging is a good way to develop and assess students' ability to synthesize material over the course of a class.

Resources

To Blog, or Not to Blog (In the Classroom)
Kris Kelly shows how blogging can be used to move students up Bloom's Taxonomy of learning.
http://edublognology.wordpress.com/2009/03/31/to-blog-or-not-to-blog-in-the-classroom/

Making Student Blogs Pay Off with Blog Audits
Mark Sample presents a way to improve student blogs with a "self-audit" and rubric.
http://chronicle.com/blogs/profhacker/making-student-blogs-pay-off-with-blog-audits/27559

Blog Rubric
Angela Byrnes gives us a simple blog assessment rubric.
http://byrnesa.files.wordpress.com/2010/11/blogging-rubric1-copy1.jpg

Wikis

Wiki means "easy" in Hawaiian, and that's a perfect way to describe this collaboration tool. Unlike a blog, which is designed to have a single author, a wiki allows for collaborative Web authoring. Like all social media applications, a wiki allows people to create Web content without having to know anything about programming. Thus, wikis are good for hosting group projects that develop, and assess, teamwork and team building.

Group Teaching Modules

In *Turning Learning Right Side Up: Putting Education Back on Track,* Russell L. Ackoff and Daniel Greenberg point out that the best way to learn is to teach (2008, Pearson Prentice Hall). As an example, they point out that most of what higher education instructors teach is something that they learned after they themselves were students. In other words, most of what instructors teach is material that they learned on their own. Instructors have the ability to learn themselves, and perhaps it is the ability to learn on one's own that is the most important skill to learn from formal education.

Few instructors would deny that teaching a concept is the best way to learn it oneself. Ackoff prefers the phrase "explaining something to someone such that they understand it" to "teaching," probably to differentiate it from teaching as lecturing, which may or may not produce understanding. Ackoff provides two reasons why explaining is the best learning. One, it requires the explainer to understand the material himself or herself. Two, it requires the explainer to "figure out how to link their frame of reference to the worldview of the person receiving the explanation, so that the explanation can make sense to that person, too." The explainer must circle around the topic to understand it, and its value, from different perspectives and thus get underneath it in a way that produces a deeper understanding for themselves.

The implication of this fact is that turning students into teachers can be the best way to produce and assess learning. Wikis provide a perfect means of making students teachers. Students can be put into small groups and required to produce a module that teaches an assigned concept related to class. A single class wiki can support all the modules, with each linking to its own site off of the homepage. Wikis allow users to add as many pages as they

would like, providing a perfect way to structure the module. Wikis can support text, photos, videos, links, and almost any sort of file.

It's best to give the students a broad scaffolding to help them organize the presentation. For instance, each group might be required to create a homepage for their project on the wiki, along with a section for content delivery, discussion, and assessment. It is especially valuable to require students to create a means of assessing the learning of someone who has gone through their module. The assessment can be in the form of an online quiz or even a game. This assessment forces the student to think about what is important in the module they are teaching and what they would want someone to get out of it. There will also need to be rules about group collaboration to ensure that everyone is pulling his or her load and contributing to the project, as well as a development timeline with milestones and a check in process to ensure that each group is making adequate progress.

The teaching module itself can be assessed along a number of axes:

- Organization:
    - Is the module easy to navigate?
    - Does the content flow in a logical manner so that the learner can follow it?
- Presentation
    - Are the learning tools appropriate to the content?
    - Is the content clear to the learner?
- Content
    - Is the choice of topics appropriate?
    - Is the content at the proper level so that a novice can understand it?
    - Is the content comprehensive enough to adequately inform the learner about the topic? (Note that this measure assesses the group's level of understanding itself.)
- Assessment
    - Does the assessment module adequately measure learning?
    - Is the assessment clear and unambiguous?
- Group collaboration
    - Did everyone contribute sufficiently to the project?
    - Did the group do adequate planning?
    - Did the group maintain the established development timeline?

Wikipedia

Most academics consider Wikipedia the devil's work and forbid their students from using it for research. Yet we all use Wikipedia, including those who forbid their students from using it. In fact, studies have shown that Wikipedia is about as accurate as Britannica, yet more comprehensive. One common misunderstanding is the belief that Wikipedia is unvetted. In

fact, there is a large group of volunteer academics who police articles and apply strict rules for submissions. For instance, Wikipedia's motto is "no original thought," meaning that everything must be cited, and uncited material is quickly removed.

Developing Wikipedia articles can be a great way to generate and assess learning. One of the best examples came in spring 2008, when Professor Jon Beasley-Murray at the University of British Columbia had the students in his class "Murder, Madness, and Mayhem: Latin American Literature in Translation" create articles for Wikipedia on the books that they read. (*http://en.wikipedia.org/wiki/User:Jbmurray/Madness*)

Wikipedia even has a built-in assessment mechanism, the awarding of article stamps of quality by a group of academic editors called the "FA Team." This group not only flags articles that violate Wikipedia's strict content guidelines — including the requirement to write in a more academic rather than personal style — they designate high-quality articles as either a "Good Article" or a "Featured Article." About 1 in 800 articles reach Good Article status, while 1 in 1,200 reach Featured Article status. Beasley-Murray guaranteed an A for Good Articles and an A+ for Featured Articles.

The results? The students, who worked in groups of two or three, produced three Featured Articles and eight Good Articles, an exceptional result given how few articles achieve these levels. These articles receive thousands of hits per month, demonstrating to students the value of their work. Now over 30 universities have projects in Wikipedia.

Students can be put into groups to develop articles on class topics if such articles do not currently exist or to revise existing articles. In either case the exercise will demonstrate knowledge of the topics, the ability to express that knowledge clearly in grammatically correct writing, and the ability to research the topic to put together a defended and well-cited work. The fact that the work they produce will be public and used to teach others about the topic adds to the motivation, leading to a subsequent improvement in quality.

Resources

Wikipedia: School and University Projects
Wikipedia page with information on dozens of school projects using Wikipedia, plus helpful guidelines on developing a project and contacts.
http://en.wikipedia.org/wiki/Wikipedia:SUP

Globalization 101
David L. Stoloff has his students research another country and post their reports on a wiki, which students from those other countries then critique. A great use of social media.
http://www.insidehighered.com/news/2010/11/04/sloan

VoiceThread

One major disadvantage of learning management system discussion is that it is separate from the lecture. Students in a face-to-face classroom can stop the instructor during the lecture to ask questions, whereas students in an online classroom generally read or watch the lecture at one time and then discuss it in a separate forum later. Any questions or thoughts that the students have during the lecture are generally forgotten by the time that the students reach discussion. Plus, online discussion is usually tracked into preset questions determined by the instructor.

But VoiceThread allows online instructors to reconnect discussion to the lecture by uploading PowerPoint slides, videos, photos, etc., and adding voice narration to create a multimedia presentation. Best of all, viewers can add their own comments to the presentation via voice or text. With VoiceThread, students can attach questions or thoughts about a lecture directly to the lecture itself when and where they apply. The result is a discussion that is integrated into the lecture itself.

The advantages of VoiceThread include the following:

- **Student-driven discussion:** Discussion originates from the students themselves, and thus students tend to bring more of themselves into the conversation. Discussion is freer and more open, touching on a wider variety of issues.

- **A growing lecture:** Discussion in a traditional online forum never leaves the classroom. The class is archived and discussion forums are wiped clean for the next group, meaning that the insights are lost. But because discussion in VoiceThread is attached to the lecture itself, which can then be used for the next class, students are adding to the lecture itself, which grows from class to class. Students contribute to an ongoing conversation with future classes.

- **Improved social presence:** Students find that the ability to see and hear their instructor and classmates improves the sense of social presence of others in the classroom.

- B**etter understanding of nuance:** Students are better able to understand the nuances of discussion when they can hear the tone in someone's voice.

VoiceThread Uses

There are two general ways to use VoiceThread for assessment. First, lectures can be delivered with VoiceThread, and students can be required to post comments to the lectures. This will help ensure that students view the lectures and is a good way to get students to

think about the lectures. Students can even be required to suggest outside resources to help fellow students do research into topics covered in the lecture. For visual topics, such as art assessment, students can draw directly onto the image to make points about artistic composition and the like. Assessment categories for VoiceThread discussion are essentially the same as for online discussion: number of postings, depth of thinking, replies to others, etc.

The second use of VoiceThread is for student projects. VoiceThread is an excellent way to deliver the teaching modules mentioned in the use of wikis discussion above. Students can develop the modules as PowerPoint slides and then, after uploading them, simply add voice comments. The resulting VoiceThread can be public or private and can be linked within a wiki or even embedded into the wiki itself. The exercise will also help teach students how to prepare PowerPoint presentations, a valuable skill in most any field.

ASSESSMENT CATEGORIES

The two general categories for assessing student projects in VoiceThread are content and presentation. The subcategories under each include the following:
- Content
    - o Comprehensive
    - o In-Depth
    - o Coherent
- Presentation
    - o Visuals
        - Images, not outlines
        - Visual supports the commentary
    - o Voice
        - Sound quality
        - Tone (emotion)
    - o Engagement
        - Illustrates the importance of the topic for the audience
        - Questions for the audience

VoiceThreads about VoiceThread in Education

- Higher Education Student Outcomes
http://voicethread.com/#q+college.b99673.i508133

- 100 Ways to Use VoiceThread in Education
http://voicethread.com/#q.b26224.i145977

Educational VoiceThread Examples

- Book Study
    - o *http://voicethread.com/community/library/Higher_Ed_analysis_of_Tim_OBriens_The_Things_They_Carried/*
- Foreign Language Report
    - o *http://voicethread.com/community/library/HigherEd_Studying_Abroad_in_Ecuador_David_Thompson/*
- Student Teaching
    - o *http://voicethread.com/community/library/Higher_Ed_teaching_with_technology_from_Ellen_Dobson/*
- Art Class
    - o *http://voicethread.com/community/library/Higher_Ed_Online_Learning_from_Michelle_PacanskyBrock_2/*
- Photography Class
    - o *http://voicethread.com/community/library/Higher_Ed_Online_Learning_from_Michelle_PacanskyBrock/*
- Shared Lessons
    - o *http://voicethread.com/#q.b105590.i537904*
- Photo Journalism
    - o *http://www.afterchernobyl.com/*

DIGITAL STORYTELLING

It's been said that we remember stories. In fact, the earliest form of teaching was storytelling, as tribal elders used stories to teach import life lessons to children. This tradition continued as more formal societies developed. The ancient Greeks developed myths to convey morals about proper behavior and becoming a good citizen. Unfortunately, higher education seems to have forgotten about the value of storytelling in teaching, as most lectures focus on conceptual points rather than stories.

But storytelling can be used as a valuable teaching and assessment tool. In particular, digital storytelling is a powerful form of expression that can get students to understand conceptual issues at a deeper level by applying them to a personal situation. Systems such as Windows Movie Maker allow students to load photos or videos and then add a voiceover to create five-to-ten-minute digital stories to illustrate a point. For instance, students can be required to create a digital story to persuade their audience to take action on an issue related to class. Students in an environmental studies class can chose an issue and create a real or hypothetical story about someone affected by the issue. A nursing class can assign students to create stories about themselves, friends, or relatives in a healthcare situation to force students to think about the patient's experience.

The assessment categories will be similar to those of VoiceThread, but with more of a focus on conveying the emotional experience to the viewer:

- Content
  - o Connection of story to a wider topic
    - Proper focus
    - Human element of a topic comes through
  - o Draws the viewer in
    - Establishes the importance of the story
    - Story moves forward in a coherent manner
- Presentation
  - o Images support the story
  - o Text uses, if needed
  - o Sound quality
  - o Tone shows proper emotion

Resources

DigiTales
An excellent website on digital storytelling. Includes ideas, examples, and scoring guides.
http://www.digitales.us/gallery/other_story_sites.php

Digital Storytelling Tools for Educators.
Silvia Tolisano's 120-page book that can be downloaded for free or purchased in the print version.
http://www.lulu.com/product/paperback/digital-storytelling-tools-for-educators/6257307

Stories for Change
Wonderful repository of digital story examples and ideas.
http://storiesforchange.net/

Personal Learning Environment

Web 2.0 technology has led to a new type of learning medium called the Personal Learning Environment (PLE). A PLE is essentially a series of tools that allow the student to draw together various resources around a topic of interest to them. For instance, students in an anthropology course can be required to pick a topic that interests them, such as the connection between the growth of civilizations and organized religion. They would be required to create a blog on their chosen topic and make weekly postings as well as comment on others' postings. The postings must demonstrate original thinking on the topic and apply concepts from class.

Their PLE would also have a means for them to gather resources on their interest, such as links to videos, webpages, and other blogs. In this way they would be creating a repository of resources that would update them on new information or research concerning their interest.

They have now formed a personal learning network that allows them to develop their interest.

The PLE is not just a way of gathering information; it is a way of communicating with others. Because the blog is open, students may gain followers outside of the classroom who share their interest. They can use these followers to learn about new stories on their topic or other resources. At the very least, students can be required to subscribe to other blogs on their chosen topic, as well as professional groups in LinkedIn or the like, in order to communicate with others. They have now formed a personal learning network that allows them to develop their interest.

One of the advantages of the PLE is that it fosters self-learning. Much of our learning comes outside of formal education. While this once meant reading newspapers and books, today this increasingly means learning from social media. In some sense we have all created a PLE around ourselves in our choice of college majors, magazine and newspaper subscriptions, etc. We gather information related to our interests from a variety of sources. Thus, teaching students how to use the tools of social media to pursue their interests imparts a valuable life skill.

A 7th Grade PLE
A student talks about her class PLE.
http://www.youtube.com/watch?v=YEls3tq5wIY&feature=related

Personal Learning Networks for Education
Good explanation of the value of a PLN.
http://www.youtube.com/user/skipvia#p/a/u/1/q6WVEFE-oZA

7 Things You Should Know about Personal Learning Networks
Excellent overview of the PLN concept.
http://skunkers.pbworks.com/f/Personal+Learning+Environment.pdf

The Networked Student Model for Construction of Personal Learning Environments
Nice outline of a PLE.
http://www.ascilite.org.au/ajet/ajet26/drexler.html

Personal Learning Environments, Networks, and Knowledge
A great free course for educators exploring the PLE.
http://ple.elg.ca/course/moodle/course/view.php?id=3

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