Assessment for Free

Fully Integrating Learning and Assessment Practices

Peter E. Doolittle
Assistant Provost of Teaching and Learning
Executive Director, Center for Instructional Development and Educational Research
Professor, Educational Psychology, Department of Learning Sciences & Technology
Virginia Tech • Blacksburg • Virginia

Anticipation Guide

Directions: Rank the following instructional interventions with respect to which has the greatest impact on student learning (1 = most, 3 = least)

.24 ∗ Use of computer technology in class

(Timmerman & Kruepke, 2006)

.50 ∗ Use of Inquiry-based teaching methods

(Furtak, Seidel, Iverson, & Briggs, 2012)

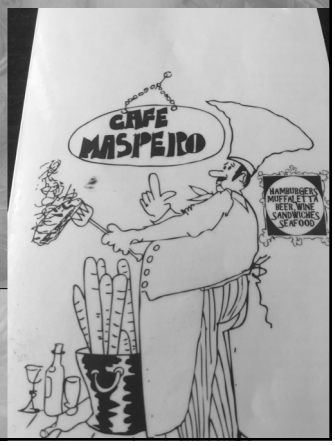
.73 ∗ Provision of performance feedback to students

(Haddie, 2008)

effect size: 0.2 = small; 0.5 = medium; 0.8 = large

Overview

1. Introduction
2. Learning First
3. Program & Course Assessment
4. Examples & Strategies
5. Conclusion



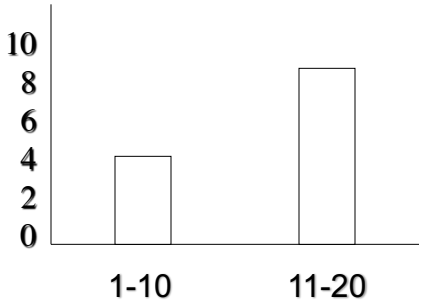
Practical Ideas • Examples • Integrating Learning & Assessment • Efficient, Effective, Simple, Useful, Meaningful • Graded Assignments with Assessment • Flexible Tools

Embedding Assessment is a Change in Perspective

Learning First

processing

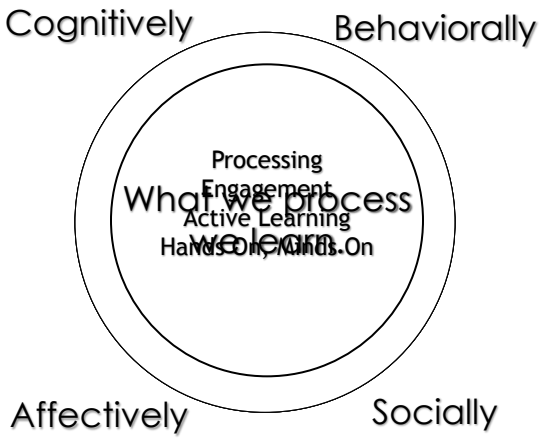
Activity #1



Activity #1

- Meaningful Learning
- Elaborative Learning
- Imagery
- Self-Generation
- Self-Reference Effect
- Encoding Specificity
  - State-dependent
  - Context-dependent
  - Transfer-Appropriate Processing

Processing



7 Principles for Developing Deep & Flexible Knowledge

1. Learning through practice at retrieval
2. Learning through varied tasks
3. Learning for varied purposes
4. Learning at the principle level
5. Learning awareness and control (metacognition)
6. Learning embedded in prior knowledge & experience
7. Learning in response to developmental feedback

(Engle, 2006; Halpern & Hakel, 2003; Mariano, Doolittle, & Hicks, 2009; Wagner, 2006)

Oral Explanations

Learning Environment (faculty course strategies): Students create clear and coherently organized 10-15 minute videos that reflect the student's understanding of the current topic under discussion, plus an application to their lives.

Learning Artifact (student's processing and result): Analyze and interpret readings; organize concepts and ideas; apply to/problem solve a life issue; create an oral explanation (artifact)

Learning Assessment (fac, student, admin assessment): Video are assessed using a scoring guide focused on organization, clarity of thought and expression, essential content explanation and application.

Example of Oral Explanations

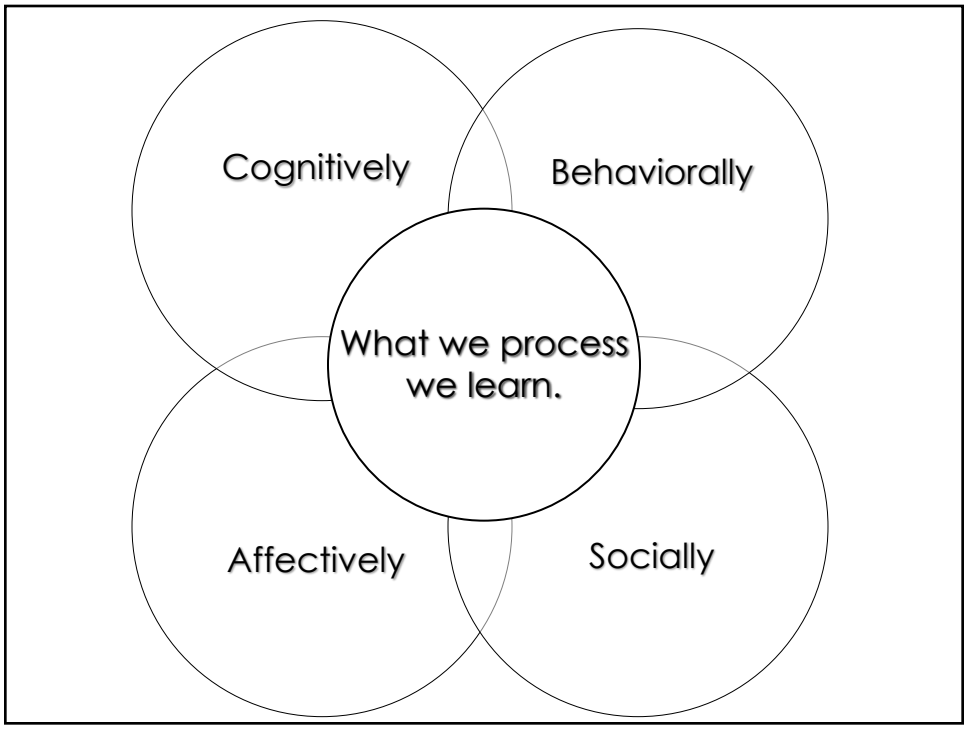
Each Oral Explanation is worth 100 pts and will be graded using the following criteria:

1. Organization 20 pts
   a. are introductions and conclusions used effectively?
   b. do the expressed ideas follow a logical progression?
   c. are explanations and applications provided?

2. Clarity of Thought and Expression 20 pts
   a. are the ideas expressed well, well thought out, and integrated?
   b. are there clear and logical transitions between ideas?
   c. are correct grammar and syntax used?

3. Essential Content Explanation 30 pts
   a. does the content reflect the addressed constructivism?
   b. does the explanation explain the main concept components?
   c. is the content of the explanation free from personal interjections?

4. Essential Content Application 30 pts
   a. is a problem, issue, or situation explained clearly?
   b. are concepts from texts/class used to address the cited problem?
   c. is the application thorough, meaningful, and appropriate?

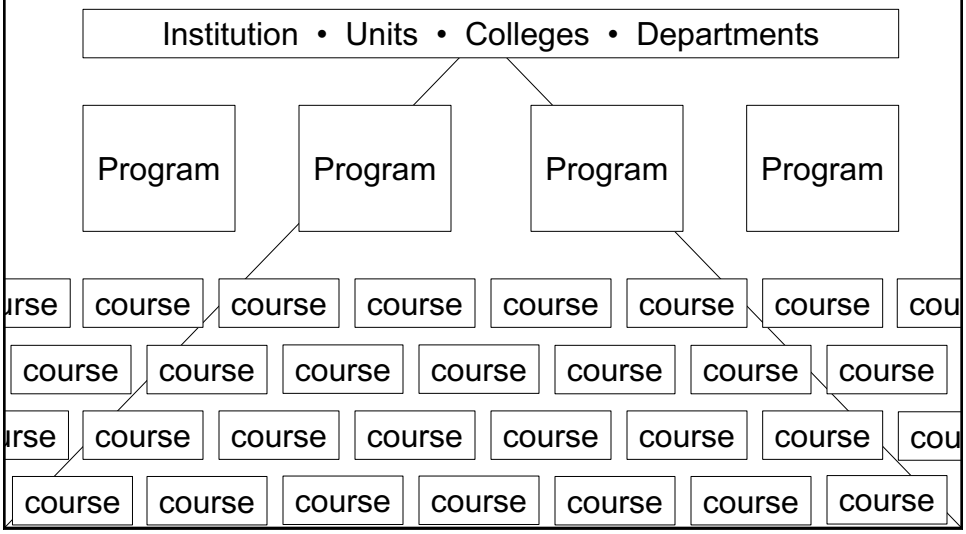


Top Down →← Bottom Up
Program →← Course

landscape

The Need for Clarity

Top Down →← Bottom Up
Program →← Course



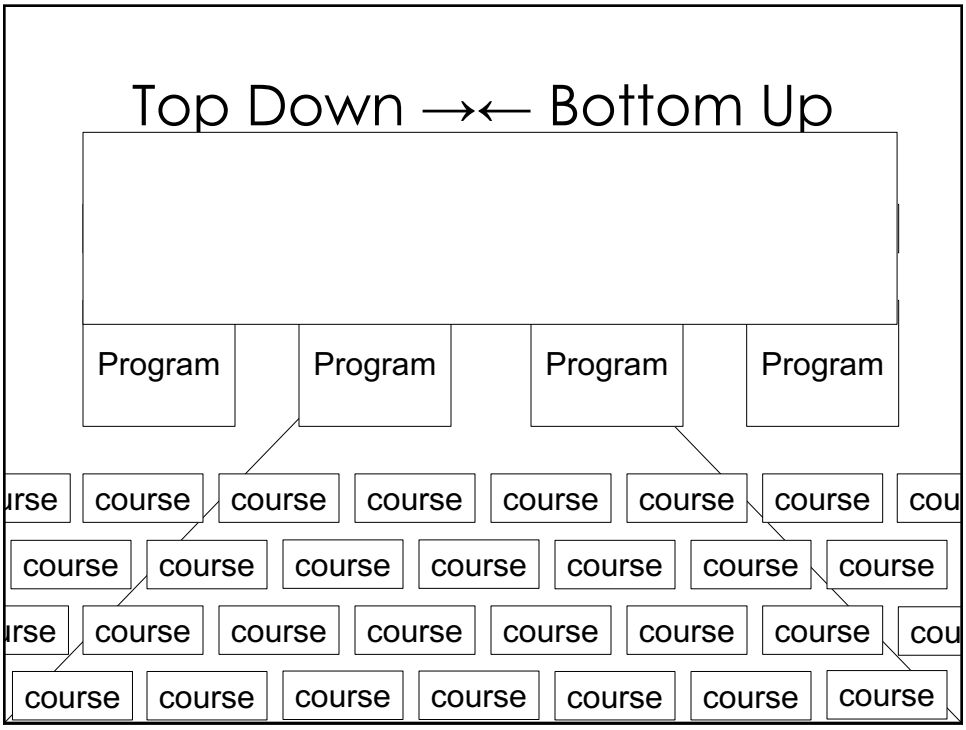
Top Down →← Bottom Up

A generic approach to systematic assessment:

- Goals
  - intents; aspirations
- Outcomes
  - expectations; objectives
- Measures
  - tools → data (direct/ind)
- Interpretations
  - criteria; targets
- Interventions
  - action plan; activities

Systematic assessment isn't magic, it's by design.

Top Down →← Bottom Up



www.manoa.hawaii.edu/assessment/

Program Assessment (Biology Major)

Program Goals: Graduates have
(1) Knowledge of biological concepts, processes, systems, and techniques; and,
(2) Knowledge and skills sufficient to enter graduate school or biology profession.

Student Learning Outcomes: Students can
(1) Describe fundamental biological processes and systems;
(2) Demonstrate proper laboratory practice, use of equipment, and techniques;
(3) Perform appropriate analysis of data and draw valid conclusions from the data;
(4) Locate, *use*, and *evaluate* scientific literature, including journals; and,
(5) Communicate findings of research in appropriate formats.

Curriculum Map

Course	O1	O2	O3	O4	O5
105/L	I	I	I	I	
205/L	I	I		I	
215	R		I		I
324/L	R&A	R&A		I	I
435	M&A		R	R	R
445/L		M&A	R	R	R
455			M&A	M&A	M&A

I=introduced; R=reinforced; M=mastered; A=assessed

105/L | 205/L | 215 | 324/L | 435 | 445/L | 455

www.manoa.hawaii.edu/assessment/

Program Assessment (Biology Major)

- Goals
  - intents; aspirations
- Outcomes
  - expectations; objectives
- Measures
  - tools → data (direct/ind)
- Interpretations
  - criteria; targets
- Interventions
  - action plan; activities

3. Exceptional	9-10
2. Acceptable	7-8
1. Marginal	< 7
3. Capstone	AACU
2. Milestone	VALUE
1. Benchmark	Rubric

Presentations
Writing Abstracts
Oral Explanations
Lab Explanations
Lab Blogs/Vlogs
Concept Ads
Tests/Quizzes

105/L | 205/L | 215 | 324/L | 435 | 445/L | 455

Multiple-Choice Items
Interpretative Items
Analysis Items

Learning Environment (faculty course strategies): Students read, analyze, and response to multiple-choice items that are based on information presented and processed in advance (e.g., chart, graph, writing).

Learning Artifact (student's processing and result): Explain and apply information; infer from given information; critique and evaluate information; select or compose a response to given information (artifact).

Learning Assessment (fac, student, admin assessment): Multiple-choice items are scored based on an answer key.

Multiple-Choice Items
Interpretative Items
Analysis Items

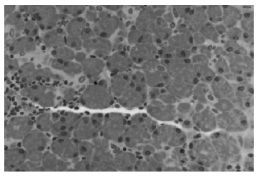
Standard Multiple-Choice Item

1. The mathematical description of concentration changes of drugs within the body is
   a. bacitracin
   b. Pharmacokinetics
   c. prophylaxis
   d. toxicity

[b]

Multiple-Choice Items
Interpretative Items
Analysis Items

Multiple-Choice Interpretive Item



1. Considering the cytoplasm and ribosome distribution in the slide above, this is most likely a slide of:
   a. Mitochonria
   b. Lymph node
   c. Nissl bodies
   d. Pancreatic acinar tissue

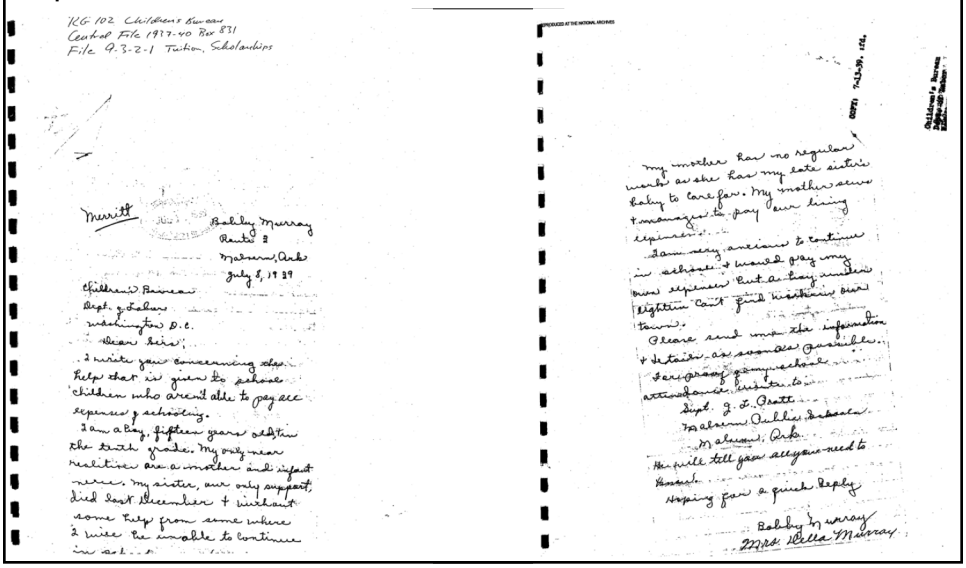
Multiple-Choice Items
Interpretative Items
Analysis Items

Learning Environment (faculty course strategies): Students read, analyze, and response to multiple-choice items that are based on information presented and processed in advance (e.g., chart, graph, writing).

Learning Artifact (student's processing and result): Explain and apply information; infer from given information; critique and evaluate information; select or compose a response to given information (artifact).

Learning Assessment (fac, student, admin assessment): Multiple-choice items are scored based on an answer key.

Source 3: Read the letter by Bobby Murray and apply the SCIM strategy for analyzing primary historical sources. Focus on what the letter tells you about what it was like for a boy during the Depression.



RG 102 Children's Bureau
Central File 1937-40 Box 831
File 9-3-2-1 Tuition, Scholarships

Merritt

Bobby Murray
Route 2
Malvern, Ark
July 8, 1939

Children's Bureau
Dept. of Labor
Washington D.C.

Dear Sirs;

I write you concerning aid to help that is given to school children who aren't able to pay all expenses of schooling.

I am a Boy, fifteen years old in the tenth grade. My only near relatives are a mother and infant niece. My sister, our only support, died last December + in-law + some help from some where I will be unable to continue in sch...

My mother has no regular work as she has my late sister's baby to care for. My mother + manages to pay our living expenses.

I am very anxious to continue in school + would pay my own expenses but as I am under eighteen can't find employment.

Please send me the information + details as soon as possible.

I am a Boy, fifteen years old in the tenth grade. My only near relatives are a mother and infant niece. My sister, our only support, died last December + in-law + some help from some where I will be unable to continue in sch...

Dept. of Labor
Children's Bureau
Washington, D.C.

He will tell you all you need to know.

Hoping for a quick reply

Bobby Murray
Mrs. Della Murray

Source 2: Analyze the following Australian Bureau of Statistics in order to determine xxx, yyy, and zzz. If you wanted to live in Australia, which city would be financially the most beneficial?

Average Retail Prices of Selected Items, Eight Capital Cities, June quarter 2011

Items	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra
	PRICES IN CENTS							
Milk, 2 ltr whole milk	306	286	256	242	236	324	325	256
Bread white loaf, sliced (650g-750g)	351	351	316	349	306	318	394	369
Roast beef (1kg)	1059	1071	1117	1019	1078	1070	1016	1154
Bacon, middle rashers (1kg)	1066	1030	978	962	971	983	1052	1009
Bananas (1kg)	1312	1288	1199	1312	1405	1242	1146	1311
Potatoes (1kg)	193	261	243	287	272	247	326	327
Carrots (1kg)	219	212	238	208	178	211	277	226
Pineapple, sliced (450g can)	217	213	207	206	211	215	215	210
Chocolate, milk (200g block)	412	422	432	424	408	425	436	425
Eggs, free range (1 dozen)	524	530	540	510	533	513	515	539
Jam, strawberry (500g jar)	335	331	333	311	335	331	354	344
Baked beans, in tomato sauce (420g can)	158	163	148	159	144	171	166	163
Laundry detergent (675g)	899	954	840	838	898	841	936	820
Toilet tissue (8 x 180 sheet rolls)	608	640	630	672	676	520	520	648
Petrol, unleaded (1 litre)	143	142	144	141	142	150	153	143
Beer, full strength (24 x 375ml bottles, case)	3992	4017	4055	4450	4262	4533	4809	4028
Draught beer, full strength, public bar (285ml glass)	342	392	341	430	394	383	391	333
Scotch, public bar (30ml nip)	523	640	526	592	636	492	515	496

Gen Ed Shuffle

Criteria
Descriptions
Rubric

Reasoning in the Social Sciences

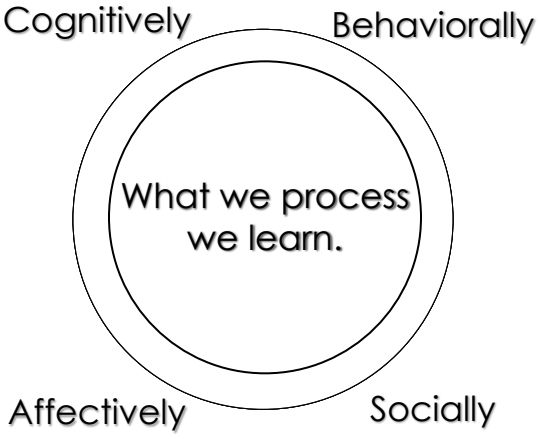
Outcome 2: Analyze human behavior, social institutions, and/or patterns of culture using theories and methods of the social sciences.

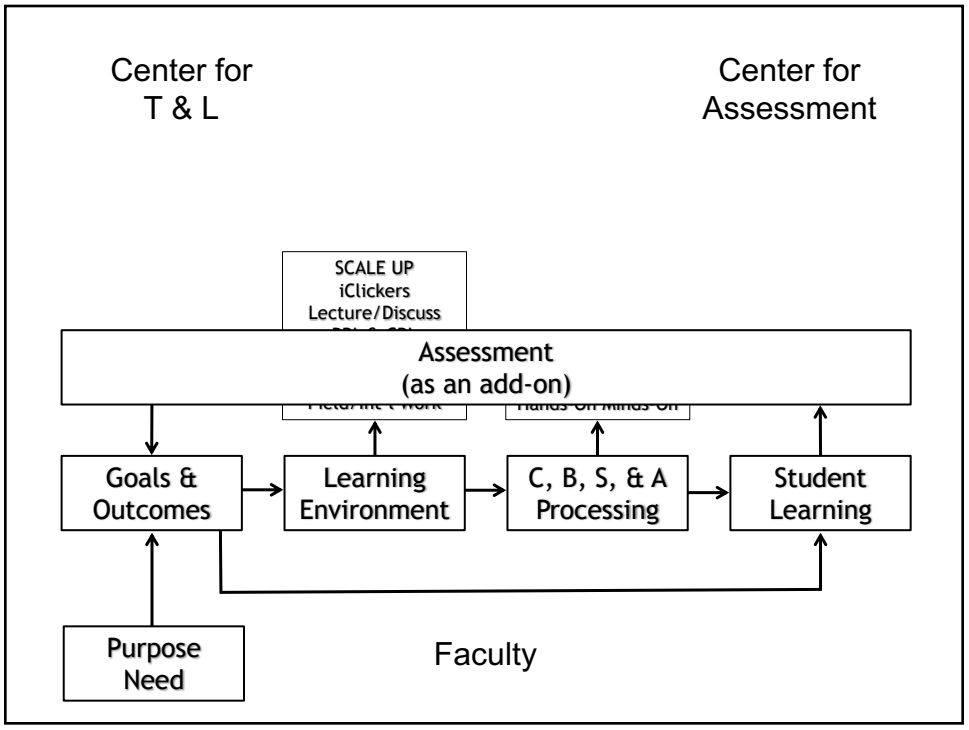
Satisfying Course	Course Content	Course Pedagogy	Course Assessment	Assessmnt Grading	Program Lvl Interpretation
History	Blah, Blah	Reading	Paper	100 pts	AAC&U VALUE Rubrics 3 – Capstone 2 – Milestone 1 - Benchmrk
Geography	Blah, Blah	Media	Project	50 pts	
Psychology	Blah, Blah	Lecture	Test	100 pts	
Sociology	Blah, Blah	Coop Lrn	Presentation	200 pts	

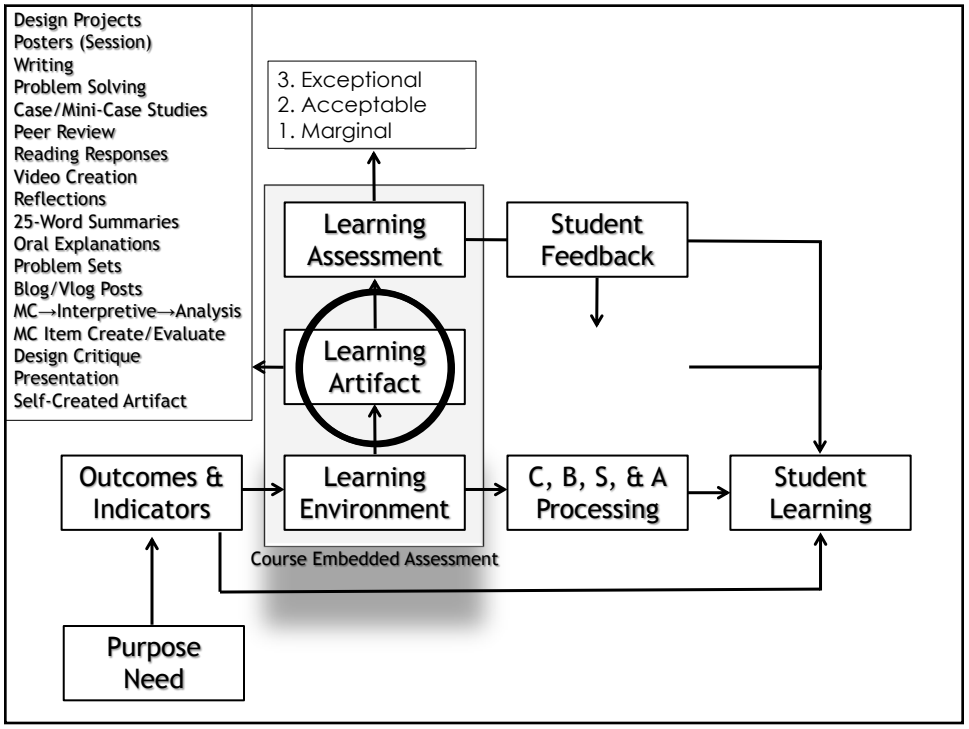
Mental Break

Designing Courses with Course-Embedded Assessment

learning artifacts




Center for
T & L
Center for
Assessment
SCALE UP
iClickers
Lecture/Discuss
Assessment
(as an add-on)
Goals &
Outcomes
Learning
Environment
C, B, S, & A
Processing
Student
Learning
Purpose
Need
Faculty


Design Projects
Posters (Session)
Writing
Problem Solving
Case/Mini-Case Studies
Peer Review
Reading Responses
Video Creation
Reflections
25-Word Summaries
Oral Explanations
Problem Sets
Blog/Vlog Posts
MC→Interpretive→Analysis
MC Item Create/Evaluate
Design Critique
Presentation
Self-Created Artifact
3. Exceptional
2. Acceptable
1. Marginal
Learning
Assessment
Student
Feedback
Learning
Artifact
Outcomes &
Indicators
Learning
Environment
C, B, S, & A
Processing
Student
Learning
Course Embedded Assessment
Purpose
Need

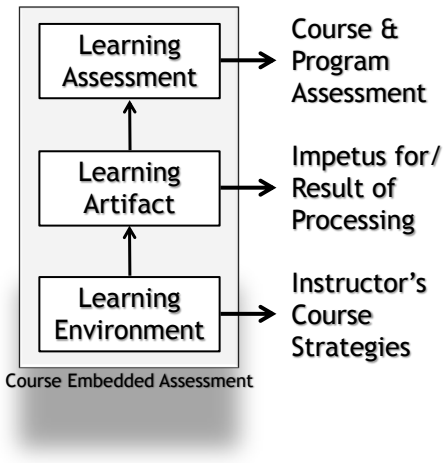
Strategies + Processing = Learning

strategies

Strategies + Processing = Learning

Strategies + Processing

1. Oral Explanations
2. MC Analysis Items
3. Poster Sessions
4. 25-Word Summaries
5. Design/Build Lab
6. Twitter World Leaders
7. Peer Review Projects
8. Think Pink



Poster Sessions

Learning Environment (faculty course strategies): Student groups produce conference-style posters and present the posters in a poster session (s, f, a).

Learning Artifact (student's processing and result): Select, research, organize, summarize, and communicate specific energy alternatives (e.g., nuclear fusion, biofuels, tidal energy) in a poster format (artifact).

Learning Assessment (fac, student, admin assessment): Group posters are assessed using rubrics by peers, faculty, administrators, and course instructor.

John Chermak, Virginia Tech, jchermak@vt.edu

Chermak Resources and the Environment Poster Rubric (DRAFT)

Group Number, Energy source: _____, 20 points

Criteria	3	2	1	0
Organization (3)	Well Organized, followed instructions	Well organized, did not follow instructions	Poorly organized, did not follow instructions	Random
Readability, Neatness (2)		Easy to read and understand, Good curb appeal	Adequate	Did not use template provided
Cradle to Grave concept and content (9) Resources needed, Environmental impacts, Advantages/disadvantages	Covered all aspects, well thought out and described	Covered most aspects, fairly well thought out and described	Covered some aspects, poorly thought out and described	Start over
Net energy (2)		Concept and discussion included, relevant	Minimal discussion	No discussion
Figures and Tables (2)		Clear, incorporated in discussions, integrated	Adequate	Lacking
References (2)		Well used	Some used	None used

Criteria	4	3	2	1
ORGANIZATION	Defined sections Clear headings Flows nicely to assist reader without help Finished product	All present but unclear Must reread for clarity Some evidence of refinement	No headings, but sectioned Hard to follow, requires assistance Missing parts Obvious refinement required	Clutter, no definitive sections, all over the place Not all sections present
CREATIVITY	Interesting, engaging, visually stimulating Aesthetically appealing use of color, diagrams, and/or text Interest, motivation, effort, and time obviously present	Some use of color diagrams, etc. Will engage but will not stimulate	Very little use of color or pictures but enough to engage and hold attention	Bland, no variability No use of color or diagrams Boring to look at, does not catch your attention Interest, motivation, effort, and time obviously absent
ENERGY PROBLEM	Explanation and/or analysis of the problem incorrect or missing Resources inappropriate or missing Did not address advantages, disadvantages No science-specific connection addressed/present	Explanation of the problem in need of refinement Some inaccuracies/ misinterpretation of the science Imbalance and/or inaccuracies in addressing advantages and disadvantages Quality of resources selected mixed	Adequate explanation of the problem, if missing some insight Advantages and disadvantages adequately addressed Science connection present but could be developed further Appropriate use of resources	Problem fully and properly explained -- "cradle to grave" Advantages and disadvantages fully addressed Insight present Science specific connection made Content accurate, comprehensive, well-supported Excellent use of resources

OVERALL:

I LIKED	I WOULD IMPROVE
1.	
2.	
3.	

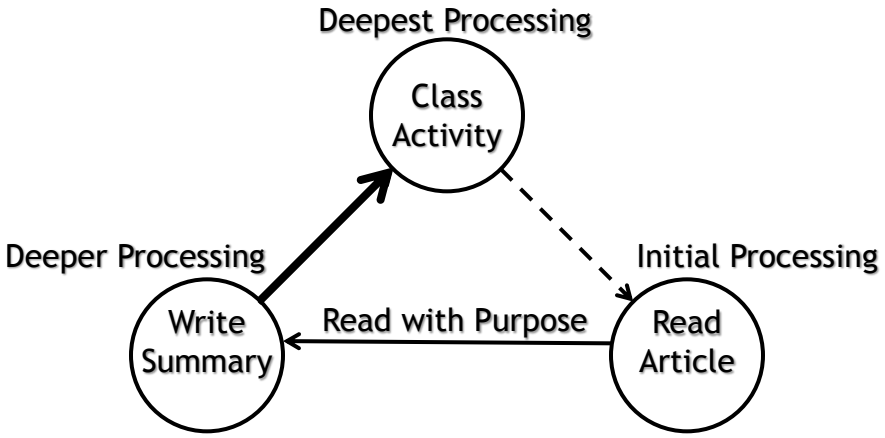
25-Word Summaries

Learning Environment (faculty course strategies): Students create a 25-word statement addressing the essential ideas of a reading, focusing on explaining and integrating ideas, not listing topics.

Learning Artifact (student's processing and result): Students read a chapter or article and extract, organize, summarize, and integrate the reading's essential ideas into a clear and concise statement.

Learning Assessment (fac, student, admin assessment): Summaries are assessed using a scoring guide focused on structural format, clarity of thought and expression, and delineation of core messages.

25-Word Summaries



25-Word Summaries

Grading: Each Chapter Summary Statement is worth 25 points and will be graded using the following criteria:

1. Structural Format — 10 pts
   - a. Is the summary 25 words or less?
   - b. Is the summary a coherent sentence, or sentences?
   - c. Does the summary avoid a simple listing of concepts, terms, or themes?

2. Clarity of Thought and Expression — 15 pts
   - a. Are the ideas expressed well, well thought out, and integrated?
   - c. Does every word in the summary have a meaningful purpose?
   - d. Are correct grammar and syntax used?

3. Delineation of Core Message — 25 pts
   - a. Does the summary accurately reflect the reading's central or essential message?
   - b. Are the reading's central or essential messages fully integrated?
   - c. Does the summary reflect an understanding of the reading?

plus Feedback:

Post-modernism views knowledge as subjective and functional, not valuable itself. Reflective, needs-based knowledge creation in post-modernist education overcomes static, constrained modernist learning allowing complete education.

The summary is an excellent representation of the reading. You have captured multiple central ideas and express them well. That said, there are a couple things to think about as you move forward to other summaries. In the first sentence, the first part is quite clear, "postmodernism views knowledge as subjective and functional," however the last phrase needs clarification for someone who has not read the article ("not valuable itself"). The article does reference that modernism views knowledge as independently valuable, but that postmodernism views the value of knowledge in context. Simply stating that postmodernism views knowledge as "not valuable itself," can lead to misunderstanding. Perhaps rather than phrasing that last part in the negative, you could switch to a more positive phrasing, such as, "postmodernism views knowledge as subjective and functional, its value contextual." Think about how you might rephrase the last part of the first sentence.

The second sentence has a similar pattern, where the first part of the sentence is very clear, yet the ending of the sentence seems murky, "allowing complete education." What does that really mean? In what way is postmodern education more "complete" than a modernist education? By "complete" do you mean personally relevant? Socially useful? Both objective and subjective? How might this be clarified?

Finally, think about how the two sentences might be combined to increase their meaningfulness. The first sentence focuses on the subjective nature of postmodernism and the second sentence focuses on postmodernist education (an application). Is there a way to combine these or two sentences or transition between the two sentences to make the link between subjective knowledge and flexible education more apparent?

Design/Build Lab

Learning Environment (faculty course strategies): Junior Architecture students design, develop, and implement a full-scale architecture build project, including imaging, fundraising, fabricating, and building.

Learning Artifact (student's processing and result): Ideate and brainstorm possible problem solutions; work with and negotiate with clients; fundraise; fabricate and build a structure for community use (artifact).

Learning Artifact (student's processing and result): Students assessed on imaging, fundraising, fabricating, and building performance via scoring guide.

Keith/Marie Zawistowski
mzawisto@vt.edu

Design/Build Lab

Twitter World Leaders

Learning Environment (faculty course strategies): Students lead a fake/parody Twitter account of a world leader, Tweeting at least twice a day on where their leader is, what their leader is doing, who they are with, and what they maybe thinking.

Learning Artifact (student's processing and result): Explain, interpret, and analyze leaders' actions and intentions; create a leader's persona; communicate in an online format (artifact).

Learning Artifact (student's processing and result): Students are assessed on the accuracy, communication style, interaction with other leaders, and timeliness of the Tweets.

joboyer@vt.edu
kpritcha@vt.edu

Twitter World Leaders

Scoring Guide (200 points):

1. Completing Tweets
2. Content of Tweets
   - Where is the leader?
   - Who is the leader with?
   - What is the leader doing?
   - What might the leader be thinking?
   - How does the leader interact with other leaders?
3. Format of Tweets
   - Proper grammar and syntax

Think Pink

Learning Environment (faculty course strategies): Students are instructed to "skip class, do whatever they want, and give themselves a grade," where he topic relates to the class and the engaged in activity is shared with the class.

Learning Artifact (student's processing and result): Identify and select a sustainability focus; determine and complete a self-determined project; organize and communicate project design, development, and results.

Learning Artifact (student's processing and result): Students self-evaluate based on completion, learning, challenging of self, and depth of engagement.

Think Pink

PINK TIME SELF-EVALUATION RUBRIC

Check the box next to each descriptor that accurately describes your activity and experience. The descriptors "DEVELOPING," "COMPETENT," and "EXEMPLARY" do not correlate with a letter grade. This is NOT meant to steer you towards a certain grade. This is meant to capture your honest self-evaluation of your activity. Honesty is the most important thing here. It is **highly unlikely** that you will check every box in a category or that all of your marks will be in one category.

DEVELOPING

- ☐ I **acquired** new knowledge **passively.**
- ☐ I thoughtfully and accurately engaged **1** learning tool for my activity: reading/listening/watching; socially interactive; creative/design; computational; etc.
- ☐ I spent **less than 3** hours on my activity.
- ☐ My values, beliefs, and skills were **minimally** challenged by my activity
- ☐ I explored my activity at a **basic level**, resulting in **little insight** beyond the basic facts and a **low level of interest** in the subject.

COMPETENT

- ☐ I **acquired** new knowledge **actively**.
- ☐ I thoughtfully and accurately engaged **2** learning tools for my activity: reading/listening/watching; socially interactive; creative/design; computational; etc.
- ☐ I spent **between 3 and 5** hours on my activity.
- ☐ My values, beliefs, and or skills were **somewhat** challenged by my activity
- ☐ I explored my activity with **some evidence of depth**, resulting in new insight and **mild interest** in the subject.

EXEMPLARY

- ☐ I **created** new knowledge.
- ☐ I thoughtfully and accurately engaged **3 or more** learning tools for my activity: reading/listening/watching; socially interactive; creative/design; computational; etc.
- ☐ I spent **more than 5** hours on my activity.
- ☐ My values, beliefs, and or skills were **significantly** challenged by my activity
- ☐ I explored my activity **in depth**, resulting in **interest** in the subject.

Please provide short answers (i.e., 1 to 3 sentences) to each of the following questions:

(1) What did you do well?

(2) What challenges did you encounter?

(3) How did you overcome the challenge(s)?

(4) What did you learn?

Cancer

Learning Environment (faculty course strategies): Projects creating public works that demonstrate an excellent understanding of and add value to the Hallmarks of Cancer papers.

Learning Artifact (student's processing and result): Identify and research cancer hallmarks; design and develop public communication avenues; document scholarly/scientific nature of creation.

Learning Artifact (student's processing and result): Student are evaluated for their progress, as well as their product.

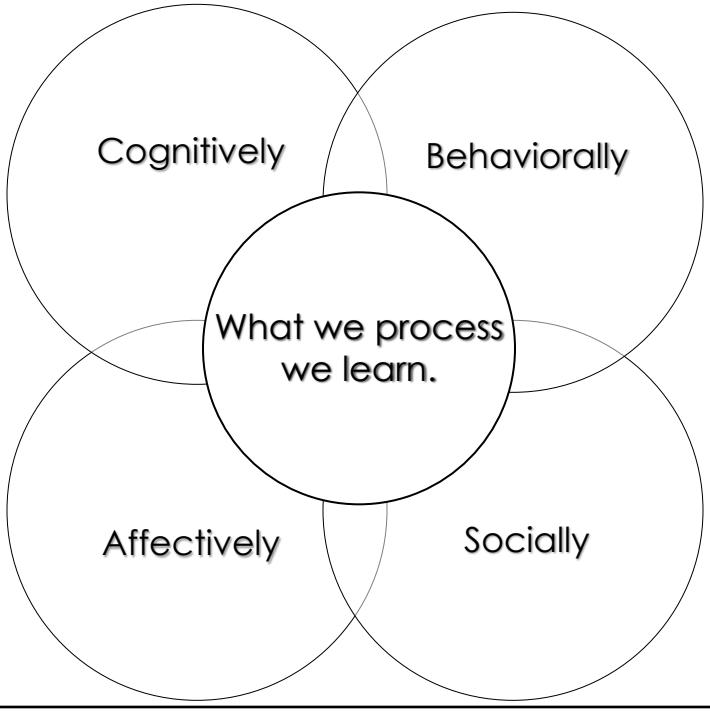
TEDx Teaching (Cancer)

Grading Rubric for Final Project

	Excellent work	Minimal work	Unacceptable work
Feb 4 - team roster and project medium ideas **5 pts**	Full credit for getting this done on time		No credit if you did not join a group
Feb 11 – team contracts **5pts**	Full credit if submitted on time and contract contains at least five meaningful items	Partial credit if late and/or incomplete	No credit if more than a week late
Feb 18 – signed contract by mentor **5 pts**	Full credit if submitted within a week of the due date	Partial credit if more than a week late	No credit if more than two weeks late without an acceptable explanation
Mar 4 – outline **5 pts**	Full credit if submitted by deadline and outline shows a clear plan for the project	Partial credit is submitted within a week of the due date or the plan is not clear	No credit if more than a week late
Mar 25 – 1st draft annotated bibliography **5 pts**	Full credit if submitted on time with at least 10 sources and annotation of how those sources will be used	Partial credit if up to a week late, less than 10 sources or weak annotation	No credit if more than a week late.
Apr 8 – final product for at least two hallmarks **5 pts**	Full credit if submitted on time, should be complete but may still need work/polishing/revision	Partial credit if up to a week late	No credit if more than a week late
Apr 22 – final annotated bibliography **20 pts**	Full credit if well referenced and clearly annotated and on time. Sources should be reliable. Formatting	Partial credit if on time but limited in sources or annotation.	No credit if late.

Closure

integration



Top Down →← Bottom Up

A generic approach to systematic assessment:

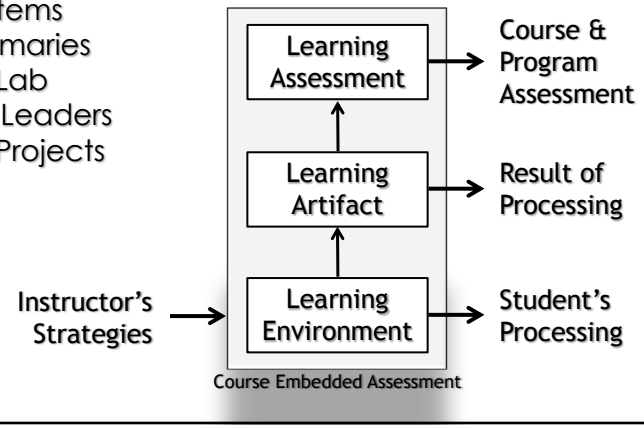
- Goals
  - intents; aspirations
- Outcomes
  - expectations; objectives
- Measures
  - tools → data (direct/ind)
- Interpretations
  - criteria; targets
- Interventions
  - action plan; activities

Systematic assessment isn't magic, it's by design.

Strategies + Processing = Learning

Strategies + Processing = Learning + Assessment

1. Oral Explanations
2. Poster Sessions
3. MC Analysis Items
4. 25-Word Summaries
5. Design/Build Lab
6. Twitter World Leaders
7. Peer Review Projects
8. Think Pink



Assessment for Free

Fully Integrating Learning and Assessment Practices

Peter E. Doolittle
Assistant Provost of Teaching and Learning
Executive Director, Center for Instructional Development and Educational Research
Professor, Educational Psychology, Department of Learning Sciences & Technology
Virginia Tech • Blacksburg • Virginia