

# Assessment OF, FOR, and AS Learning in the Chemistry Classroom

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ALVERNO COLLEGE



# Alverno College

Alverno College is a four-year, liberal arts, independent, Catholic college for women sponsored by the School Sisters of St. Francis.

- ✦ 60+ undergraduate programs (women only)
- ✦ Adult and Graduate programs open to women and men
- ✦ 1900 students (1100 undergrad; 800 grad)
- ✦ Around 65% are first generation college students
- ✦ Nearly half of undergrads are from Milwaukee
- ✦ HSI Designated, around 40% students of color
- ✦ Ability-based, non-graded curriculum
- ✦ Catholic students represent a significant population, but many other religious denominations are represented and welcomed on Alverno's inclusive campus





In 1973, Alverno College initiated a curriculum based on eight institutional outcomes. We have been successfully implementing this curriculum for **OVER 45 YEARS** in all Alverno undergraduate programs.



- **GRADUATION REQUIREMENTS** include demonstration of institutional outcomes
- Alverno educators are responsible for making learning more available by **ARTICULATING OUTCOMES** and making them **PUBLIC**



# Outcomes



Differentiate Assessment-OF-Learning and Assessment-FOR-Learning and Assessment-AS-Learning



Explore the implications of assessment practices for student learning and skill development in chemistry



Provide examples of quality assessment of student learning in the chemistry classroom



# 9 Principles of Good Practice for Assessing Student Learning

1. The assessment of student learning begins with educational values.
2. Assessment is most effective when it reflects an understanding of learning as **multidimensional, integrated, and revealed in performance over time.**
3. Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.
4. Assessment requires attention to outcomes but also and equally to the **experiences that lead to those outcomes**
5. Assessment works best when it is **ongoing, not episodic.**

# 9 Principles of Good Practice for Assessing Student Learning

6. Assessment fosters wider improvement when representatives from across the educational community are involved.
7. Assessment makes a difference when it **begins with issues of use** and **illuminates questions that people really care about**.
8. Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change.
9. Through assessment, **educators meet responsibilities to students and to the public**.

# COMPARATIVE LEARNING ASSESSMENT PRACTICES

	Content Framework	Outcomes Framework
Why assess?	To give a grade	To assist the student To advance the students To adjust the program or course
What is assessed?	Knowledge	Integrated work projects
How assessed?	Quiz or objective test	Exhibits, presentations, projects, portfolios, posters, blogs, ....
What is the standard?	100% or top students	Clearly identified qualitative criteria
When assessed?	Weekly, midterm, final	Continuously and summatively
Where assessed?	Classroom	Wherever work is demonstrated
Who assesses?	The instructor	Students, peers, instructors, other stakeholders
Who sets the standard?	Instructors and test developers	Students, peers, instructors, other stakeholders
Who knows what will be expected?	Instructors and test developers	It is public knowledge

# Testing

- is a process of measuring the level of skill or knowledge that has been reached at a specific point in time
- often follows a general format where questions are asked and students answer them (e.g., essay questions, multiple-choice questions, fill-in-the-blank questions, true-and-false questions, etc.)
- often comes at the end of learning units or courses, and result in a score or grade
- the validity and reliability of any assessment tool will affect the quality of your measurement
- often used to rank students and make decisions based on rankings

# Assessment

- is a process of applying knowledge and documenting skills, attitudes and beliefs in measurable terms
- can have different formats (e.g., might require a student to answer questions or might include talking to a student about what they know, observing a student working or talking about a subject, or collecting work/performance products that provide evidence of what a student can do with their knowledge/skills)
- can occur at various time points and can be formative or summative/cumulative
- explicit performance criteria can enhance both the validity and reliability of the assessment process
- often done with a goal of making improvements and furthering learning





Assessment-**OF**-Learning: Standards-based measurement for accountability, certification, progression

Assessment-**FOR**-Learning: Diagnostic measurement to provide developmental feedback to learner and teacher

Assessment-**AS**-Learning: Metacognitive process whereby self assessment, peer feedback, and instructor feedback are used to help students set and monitor progress toward learning goals





# Student Assessment-AS-Learning

A process, integral to learning, that involves observation and judgment of each student's **performance** on the basis of **explicit criteria**, with resulting **feedback** to the student.

It serves to confirm student achievement and provides feedback to the student for the improvement of learning and to the instructor for the improvement of teaching.

- **Performance-** multiple demonstrations of the skill
- **Explicit criteria-** judge objectively
- **Feedback-** guides you towards improvement

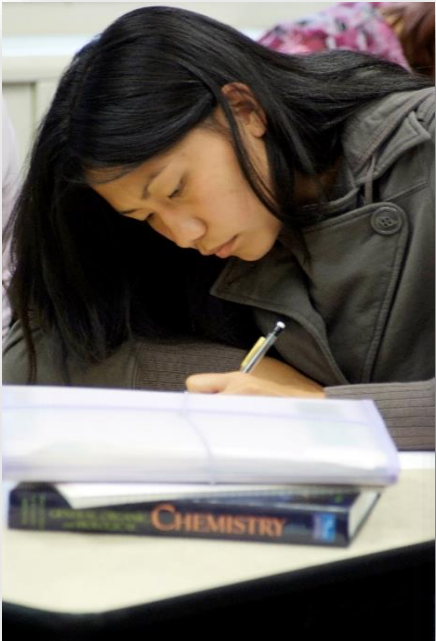


# Performance-based assessments might include:

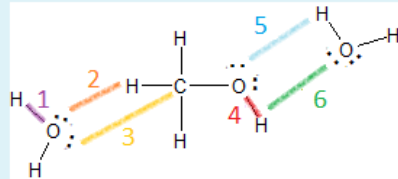
- **Presentations** that involve responding to questions and defending conclusions with evidence
- **Poster symposia** where students present original work to a diverse audience
- **Case studies** that involve problem solving (solve or write a new case study)
- **Concept maps** that require explicit connections
- **Construction of models** that incorporate central concepts and relationships
- **Simulations** of meetings, evaluations, interviews, team-based tasks
- **Portfolios** digital/actual portfolios of student work products across all courses that allow for review and identification of strengths and developmental progress
- **Debates** that require literature research, evidence evaluation, argument construction, and persuasive speaking
- **Original research** where students design and conduct their own original investigation or modify an experiment to study a new variable



# Assessment-OF-Learning: Standards-based measurement for accountability, certification, progression



Which of the following are examples of hydrogen bonding forces?



Select one or more:

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6



**IMMEDIATE FEEDBACK ASSESSMENT TECHNIQUE (IF AT®)**

Name \_\_\_\_\_ Test # \_\_\_\_\_

Subject \_\_\_\_\_ Total \_\_\_\_\_

**SCRATCH OFF COVERING TO EXPOSE ANSWER**

	A	B	C	D	Score
1.					_____
2.					_____
3.					_____
4.					_____
5.					_____
6.					_____
7.					_____
8.					_____





## Unit 2 Self Assessment

1 \*

What is your **current** level of comfort in your ability to demonstrate the following criteria independently on a comprehensive unit assessment (similar to the unit quizzes, but larger in scope):

1 = **Help!** I feel very lost and need help with concepts and/or study techniques

2 = **Almost there!** I know what I need to study and practice

3 = **Bring it on!** I am well prepared and could assess today

Consistently and correctly draw and convert between the following molecular notations: expanded (full) structural formulas, condensed structural formulas and line/stick formulas

Correctly identify selected organic functional groups in molecules

Use characteristic reactions appropriately to determine predicted products in a chemical transformation

	1	2	3
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2 \*

Go back and look at your quiz scores for Unit 2. What is the approximate average of your quiz scores for this unit?

- ☐ <50% (not meeting criteria)
- ☐ 50-69% (minimally meeting criteria)
- ☐ 70-89% (mastery)
- ☐ 90% or better (excellence)

3 \*

### Unit 2 Assessment Readiness

Self Evaluation	Course of Action
<50% quiz average and /or you feel like you need help	Review all Unit 2 concepts and connect with your instructor(s) for additional assistance.
50-69% quiz average	Review specific Unit 2 concepts before attempting assessment. Connect with your instructor(s) if a specific concept still does not make sense.
70-89% quiz average	With some additional practice and preparation, you should be ready to attempt the assessment.
90% or better quiz average	Begin the assessment whenever you are ready.

Determine where you fall in the assessment readiness evaluation above. What specific steps do you plan to take to prepare yourself for the Unit 2 assessment? Write a **SHORT** paragraph below describing your next steps to prepare for success on the Unit 2 Assessment.



# Assessment-FOR-Learning: Diagnostic measurement to provide developmental feedback to learner and teacher

## BI/CH 328 Lab Notebook Peer

### Criteria

Did the author use the standard protocol for notebooks; *work is recorded as you do it*, experiments and page numbers are listed in the table of contents, only right hand pages are used, all data is written in pen, errors are crossed out, references are listed, etc. (electron notebooks follow appropriate standards for online documentation)

Do her titles communicate the nature of the scientific problem?

Does she state the exact purposes and objectives of her experiments in her introductions? Does she relate the purposes of the experiments to the general procedures? Does she cite her sources?

Does she describe in a stepwise format the procedures in enough detail that the experiments could be duplicated?

Does she show all calculations, averages, and recorded data? Does she clearly distinguish raw data (lab) from manipulated data and results of analysis?

Does she use clear and labeled tables, figures, and graphs?

Does she address the objectives stated in the lab? Does she clearly interpret the results in her conclusions? Does she discuss the expected results they were or were not achieved in her conclusions? Does she analyze and discuss accuracy and/or precision?

If you answered no to any of the points above (all pages) where criteria were not met and write down the criteria.

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fix your calculations, revise your table and graph, and add a conclusion.

## CH213 – Course Outcome Demonstration

The principle goal of this course is a working understanding of intermediary metabolism, which is a summation of the chemical reactions in an organism. Upon successful completion of this course, students have demonstrated the ability to:

- Identify (by name, formula and function) compounds representative of the functional groups and types characteristic of the various biomolecules.
- Demonstrate relationships between structure and physical properties, between structure and chemical reactivity for these compounds.
- Analyze the structure and function of biomolecules, particularly carbohydrates, lipids, proteins, and enzymes, using structure-property and energetic frameworks.
- Draw relationships among the types of reactions, catalytic agents, and control systems in cells, especially with regard to energy production, utilization, and regulation. This phase also requires knowledge of the means by which cells solve problems involving energy transfers.
- Articulate, in writing, scientific principles (including proper use of terminology and vocabulary) and thought process for arriving at problem answers (Analysis Level 3)

These course outcomes can be further broken into unit outcomes and criteria that students demonstrate on assessments. The successful CH213 student has demonstrated the ability to:

Section 1: Atomic Structure and Chemical Bonding	Advanced Proficiency	Proficient	Minimally Proficient	Not Yet Proficient
Accurately explain and use periodic trends and the octet rule in interpreting and showing structures of atoms, ions, ionic compounds and molecules		X		
Consistently and correctly draw and convert between full structural formulas, condensed structural formulas and line/stick formulas to represent molecules, isomers, and polyatomic ions		X		
Accurately explain and use polarity of bonds and geometry of atoms in molecules to make appropriate inferences about a substance's polarity	X			
Section 2: Physical Properties and Noncovalent Interactions	Advanced Proficiency	Proficient	Minimally Proficient	Not Yet Proficient
Completely and accurately use illustrations of intermolecular forces to illustrate and make appropriate and supported inferences about water solubility and boiling point				X
Section 3: Organic Functional Groups and Reactions	Advanced Proficiency	Proficient	Minimally Proficient	Not Yet Proficient
Use definitions to correctly identify and predict acids, bases, and conjugate acid-base pairs in acid-base reactions				
Correctly identify functional groups in organic species				

# Assessment-AS-Learning: Metacognitive process whereby self assessment, peer feedback, and instructor feedback are used to help students set and monitor progress toward learning goals



## Oral Presentation – Criteria

1. Your presentation is appropriate for your audience (your biochemistry classmates who have an understanding of basic metabolic pathways, but don't know all of the details of the pathway you studied).
2. You present your material in a logical order.
3. You incorporate information from at least two reliable, scholarly sources in addition to your textbook into your presentation. This can include peer-reviewed journal articles, textbooks, reference books, etc. (you may use reliable internet sources, but you must have at least one additional source that is not an internet source – make sure you properly cite ALL sources).
4. You clearly show the relationship between your metabolic pathway and the pathways that we have studied in detail in class (glycolysis, Kreb's Cycle, and the electron transport chain/oxidative phosphorylation).
5. You clearly analyze your case study and relate it back to the metabolic pathway, showing the functioning of the pathway in health and disease.
6. Your overheads, slides, models, animations, or other presentation materials are helpful in explaining and illustrating the topic to your peers. Your handout is helpful to your peers in allowing them to follow your presentation and take additional notes.
7. You do not rely on notes in explaining your topic. You do not read from your notes or from the overhead.
8. You answer questions raised by your classmates directly and honestly.
9. Both your description of your pathway and your analysis of your case study are accurate and thorough.



## Oral Presentation – Self-Assessment

- 1) *Before* you give your presentation, explain how you will meet criteria 1-5. Your explanations should be word-processed and turned in at the beginning of your presentation. Save this document on your computer because you will add to it after you watch your video.
- 2) After you give your presentation, watch the video and explain how you met criteria 6-9.
- 3) After watching the video, answer the following:
  - What is one aspect of your presentation you think was especially successful and why? Refer to evidence from your video.
  - In future presentations, what would you do differently in terms of preparing for a presentation?
  - In future presentations, what would you do differently in terms of using presentation materials (overheads, slides, models, etc.) and handouts?
  - In future presentations, what would you do differently in terms of your delivery? Refer to evidence from your video.
- 4) Your answers and explanations from before and after your presentation should be submitted onto your e-portfolio along with your video.



# What Quality Assessment Means to Us

Good assessment is about probing what students know and can do in relation to our student learning outcomes.

- ✦ Verification of student knowledge
- ✦ Demonstration of student's ability to **use** that knowledge
- ✦ Creation of a **holistic picture** of a student's learning in a course and over time





**Quality Assessment** confirms student achievement AND provides feedback to student and instructor AND provides students the opportunity to monitor their development and progress toward learning goals.



**Quality assessment:**

- is integral to learning
- involves observation and judgment of each student's performance on the basis of explicit criteria
- includes opportunity for self assessment
- requires meaningful feedback to the student



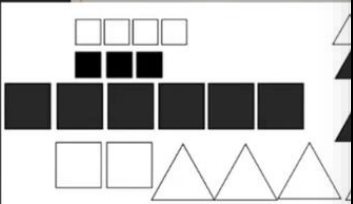
# Example: Quantitative Literacy

Compound Probability:

If I pick two shapes what is the probability that I pick a large triangle and then a small one?

⑦ If I pick that I pick one?

Total # of shapes → 55



Counting Principle:

In honor of March Madness for a basketball tournament last team, there are 3 point left. How many possible cor

$$3 \times 9 \times 5 =$$



Combination:

At the tryouts for the team, two point guards are chosen. In the fall, 10 players tried out for the point guard position. How many possible combos were there?

45 possible combos

$$n = 10$$
$$r = 2$$



$$nC_r = \frac{10!}{(10! - 2)! 2!}$$



# Example: Biochemistry

## Protein

### The goals of this project include:

- Finding, analyzing, and synthesizing reliable scientific information from primary literature sources; acknowledging all sources using complete and correct citation methods

### These goals relate to the following Biochemistry 328 course outcomes:

- Students demonstrate the ability to apply metabolic principles, enzyme concepts, and thermodynamic frameworks in appropriate contexts

intermediary metabolism

- You recognize and analyze biochemical data using analysis using

- Students demonstrate the ability to communicate in a clear and thoughtful manner

- Students demonstrate the ability to communicate with various audiences (e.g. peers, supervisors)

teins will be used to demonstrate the structure and function of proteins. Students will use their own interactive jmol tutorials during the first week.

### These goals relate to the following chemistry program outcomes:

1. The ability to use the language and concepts of chemistry fluently in written and oral communication (Communication Levels 5 and 6, supported by analysis, valuing in decision making, and aesthetic engagement)
  - Consistently uses scientific and chemical vocabulary fluently and precisely in developing coherent and substantiated communications of chemical concepts and applications
  - Effectively uses graphs, tables, diagrams, chemical structures, and equations to represent chemical data and relationships (*in this case you will be using advanced modeling to represent biochemical data and structure/function relationships*)
  - Adeptly matches communication content, style, and structure to the purpose of the communication and to the audience
  - Consistently and thoroughly meets standards of academic integrity in selection and citation of source material and in use of data to construct arguments and draw conclusions
2. The ability to use the frameworks and methodology of chemistry to solve problems independently and collaboratively (Analysis, Problem Solving, and Social Interaction, Levels 5 and 6)
  - Selects and applies appropriate strategies and models of chemistry to analyze and synthesize chemical data
  - Expresses valid interpretations based on a sound understanding of fundamental chemical concepts and analytical frameworks
  - Demonstrates appropriate and effective social interaction skills and professional behaviors in group problem solving experiences in the classroom and laboratory
  - Demonstrates creativity and sophistication in structuring, carrying out, and critiquing scientific investigations (*in this case you will demonstrate creativity and sophistication in creating and critiquing original computer tutorials*)



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## Exploration Content

Coll

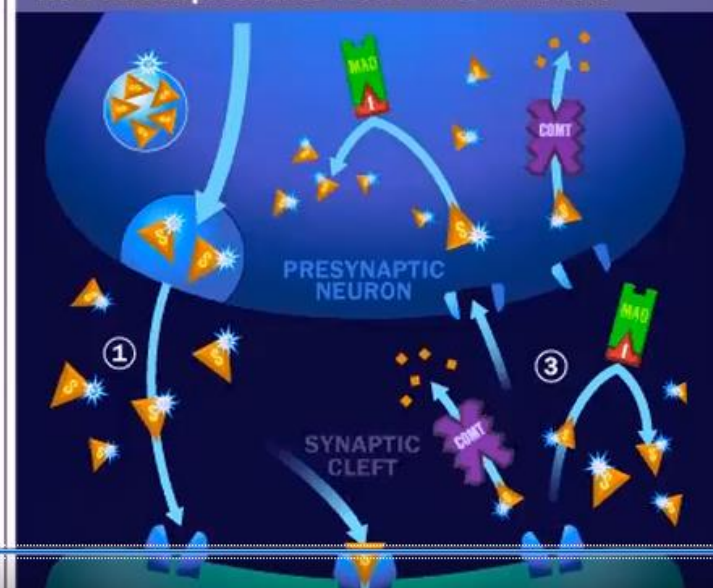
Collag

Fibrillo  
tissue  
differen  
come t  
residuFibr  
FACIT  
Netw

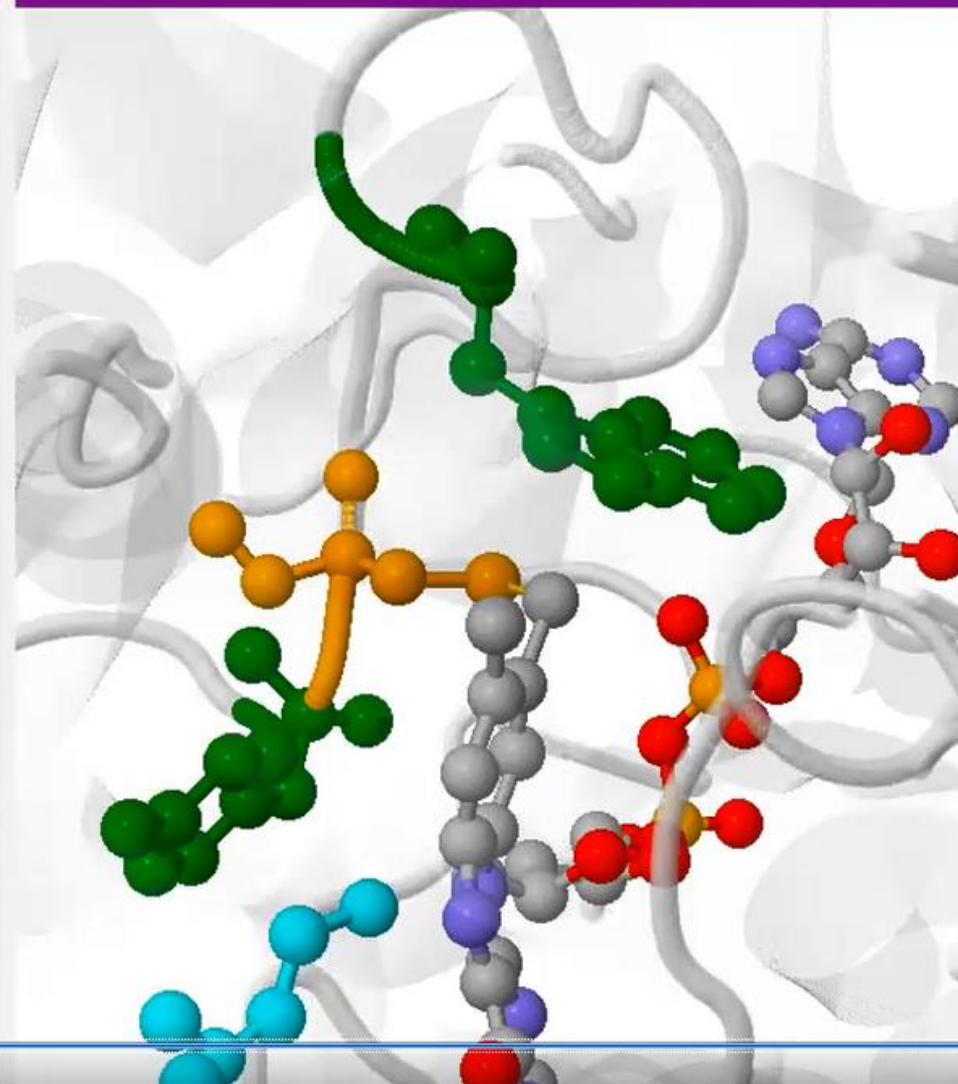
Ricin

MAO A enzymes remove multiple neurotransmitters from the brain that are involved in mood and depression. These include norepinephrine, serotonin, and dopamine. MAO inhibitors (MAOIs) function by binding to the active site of MAO A, thus inhibiting the breakdown of these neurotransmitters. This increases the levels of the neurotransmitters and allows them to influence cells that have been affected by depression. MAO B inhibitors tend to be used more for neurological disorders, such as Parkinson's (Mayo Clinic Staff, n.d.; Sub Laban & Saadabadi, 2020). Reduced hMAO A activity has been linked to aggressive behavior while overexpression of the enzyme has been linked to depression. Irreversible MAOIs, such as phenelzine, pargyline, and tranylcypromine have a strong antidepressant effect. Moclobemide, a reversible inhibitor, has fewer adverse effects, but is not as effective as the irreversible MAOIs (Finberg & Rabey, 2016).

## How Antidepressants Work MAO Inhibitors



## Jmol





# Example: Instrumental Methods

## CH 337 Grant Proposal Project

In this assessment you will write a short (3-6 page) grant proposal for the purchase of some type of analytical instrument. The agency to which you are applying (The School Sisters Society) is soliciting grant applications from local educational institutions and businesses that need funding. You should assume the roll of someone who is not necessarily knowledgeable about the instrument you wish to purchase, but you need to understand why it is important.

IMPORTANT - Do not identify the members of your group evaluating the proposals. Your readers know who wrote the proposal.

### Directions for Review Committee reading of Grant Proposals:

There is a short list of criteria below that you should use as the basis for judging the proposals. Before your group starts reviewing you should confer with each other and decide what other (if any) criteria (cost, need, timeliness of submission, good of the community, etc.) you would like to use. You may need to add more criteria later as you read, but remember to be explicit about the criteria you use, so you can provide useful feedback to each group.

Each member of the group should participate in the discussion of grant proposals. On the appointed day to discuss the proposals, each member should provide detailed feedback to the group. The feedback should be used to make funding decisions. The comments should be submitted to the instructor electronically.

### CRITERIA FOR GRANT EVALUATION:

- Shows readiness to use equipment effectively by communicating a thorough understanding of the instrument and its' uses
- Makes a convincing argument for needing the specific instrument based on advantages and limitations of the instrument, and in comparison with similar methods of analysis
- Makes persuasive argument for the need and potential uses of the instrument in her situation



as . sess ( ses') v.t.  
[late ME <ML <L  
*assess* (*us*) ptp. of  
*assidere* (*ad* + *sedere*)]

to sit down beside

Assessment is something we do **WITH** and **FOR** our students, not something we do **TO** them.



# Feedback to Students

## Focus on:

- ◆ Behavior in relation to criteria
- ◆ Observation rather than inferences
- ◆ Description rather than judgment
- ◆ The performance rather than the person
- ◆ Serving the needs of the learner
- ◆ Sharing ideas/information rather than advice
- ◆ The amount of information person can use





# Feedback Can Be...

- ◆ Written/Typed
- ◆ Oral (audio, video, in-person)
- ◆ Combination (oral and written)
- ◆ Embedded in student work
- ◆ Given by faculty
- ◆ Given by peers
- ◆ Given by external assessors





# Documenting Instructor Feedback

## Rubrics, Rubrics, Rubrics!

*...and other forms of criteria-based cover sheets, feedback grids, peer-review forms, and templates for narrative feedback*

	Poor	Fair	Average	Good	Excellent
Quality of information	o Topic not clearly conveyed o Accepted grammar terminology, etc. ignored	o Major concepts largely conveyed, but lacking details o Acceptable use of terminology, grammar, etc.	o All major concepts clearly conveyed o Some detail provided o Visual aids integrated into poster	o All important concepts clearly conveyed o High-quality visual aids enhance the presentation o Questions handled appropriately	o A professional quality poster o Questions handled professionally
Effective use of figures	o No use of appropriate figures o No connection between figures & text	o Figures not fully integrated o Some connections between figures & text	o Figures integrated into poster o Several connections between figures & text	o High-quality figures enhance the poster o Several well-explained connections between figures and text	o Figures fully integrated o Thorough & well-explained connections between figures & text
Professional presentation	o Presenter showed a lack of appropriate behavior	o Presenter did not always behave appropriately	o Presenter adequately presented their poster	o Presenter seriously presented their poster, at a level consistent with undergraduate projects	o Presenter acted with a high level of professionalism, equal to that expected at a professional conference
Ability to convey information	Was the behavior demonstrated in the discussion?				
Impact on poster viewer	Behavior	Assessors	Student	o Appropriate font size and balance between figures & text o Good balance between figures & text thorough covering of topic o Professional poster	
	Advocating	Y	Y	o Present a clear take-home message o Relevance in society of take-home message is presented o Information discussion with all viewers	
	Challenging	N	N		
	Evaluating Group Process	N	N		
	Facilitating	Y	Y		
	Gathering Information	Y	Y		
	Giving Info/Opinions	Y	Y		
	Leading	Y	Y		
	Mediating	N	N		
	Blocking: Attacking, Being Defensive, Dominating, Interfering, Rambling, Withdrawing, Wrangling	N	N		

## CRITERIA FOR EVALUATING WRITTEN RESPONSES

1. The questions are answered directly, without extraneous information. Your responses reflect a good record. Your responses are organized and clear.
2. Your responses reflect an understanding of the basic biochemistry concepts. You use biochemistry vocabulary accurately and appropriately.
3. You articulate explicitly the relationships between and among observable information (given in the questions, references or experimental data you use) and inferred information (given in your responses). You clearly relate observations and inferences.
4. You state the significance of the relationships you make. (How does your brief response to a specific question relate to the scheme of biochemistry; consider generalizations and exceptions).
5. You demonstrate skill in finding and synthesizing reliable scientific information in a responsible manner, citing citations of all source material and providing a full bibliography of references used.

## ASSESSMENT CRITERIA

\_\_\_\_\_ You determine the molar extinction coefficient of a compound from visible or UV, depending on the compound) and use molar extinction coefficient to determine concentration (Beer's Law)

\_\_\_\_\_ You determine the concentration of a protein from a standard curve and explain common biochemical protocols used for carrying out the experiment

\_\_\_\_\_ You explain what a buffer is, how it works, when it is needed, and how to prepare buffers using the Henderson-Hasselbalch equation

Criteria	S Criteria met	R Revisions needed
1) You use the standard protocol for notebooks; <i>work is recorded as you do it</i> , experiments and page numbers are listed in the table of contents, only right hand pages are used, all data is in pen, errors are crossed out, references are listed, etc.		
2) Titles communicate the nature of the scientific problem.		
3) You state the exact purpose(s) and objective(s) of the experiment in your introduction.		
4) You describe in a stepwise format the procedure used with enough detail that the experiment could be duplicated.		
5) You show all calculations, averages, and corrections of recorded data using clear tables, figures, and graphs		
6) In your conclusion you interpret your results and address the objectives stated in the introduction.		

Strengths:

Areas for Improvement:

Revisions needed:



## Standards of Tutorial Design and Presentation

Exceeds Criteria	Meets Criteria		Poor	Fair	Average	Good	Excellent
			<b>Quality of information</b> <ul style="list-style-type: none"> <li>○ Topic not conveyed clearly</li> <li>○ Accepted grammar, terminology, etc. ignored</li> </ul>	<ul style="list-style-type: none"> <li>○ Major concepts largely conveyed, but lacking details</li> <li>○ Acceptable use of terminology, grammar, etc.</li> </ul>	<ul style="list-style-type: none"> <li>○ All major concepts clearly conveyed</li> <li>○ Some detail provided</li> <li>○ Visual aids integrated into tutorial</li> </ul>	<ul style="list-style-type: none"> <li>○ All important concepts clearly conveyed</li> <li>○ High-quality visuals enhance the tutorial message</li> </ul>	<ul style="list-style-type: none"> <li>○ A professional quality tutorial</li> <li>○ A strong, coherent message ("story") supported by professional-quality visuals</li> </ul>
			<b>Effective use of <u>jmol</u> structures</b> <ul style="list-style-type: none"> <li>○ Incorrect/inappropriate use of structures</li> <li>○ No connection between structures and text</li> </ul>	<ul style="list-style-type: none"> <li>○ Structures not fully integrated</li> <li>○ Some connections between structures and text</li> </ul>	<ul style="list-style-type: none"> <li>○ Structures integrated into the tutorial</li> <li>○ Several connections between structures and text</li> </ul>	<ul style="list-style-type: none"> <li>○ High-quality structural images enhance the tutorial</li> <li>○ Several well-explained connections between structures and text</li> </ul>	<ul style="list-style-type: none"> <li>○ Professional-quality structures are fully integrated into message ("story")</li> <li>○ Thorough and well-explained connections between structures and text</li> </ul>
			<b>Professional presentation</b> <ul style="list-style-type: none"> <li>○ Presenter(s) showed a lack of appropriate behavior</li> </ul>	<ul style="list-style-type: none"> <li>○ Presenter(s) did not always behave professionally</li> </ul>	<ul style="list-style-type: none"> <li>○ Presenter(s) adequately presented their tutorial</li> </ul>	<ul style="list-style-type: none"> <li>○ Presenter(s) seriously presented their tutorial at a level consistent with undergraduate projects</li> </ul>	<ul style="list-style-type: none"> <li>○ Presenter(s) acted with a high level of professionalism, equal to that expected at a professional event</li> </ul>
			<b>Ability to convey information</b> <ul style="list-style-type: none"> <li>○ Insufficient amount of information</li> <li>○ Font/format errors that severely limit tutorial use</li> </ul>	<ul style="list-style-type: none"> <li>○ Insufficient amount of <u>jmol</u> structures or text</li> <li>○ Font/format errors that detract from message</li> </ul>	<ul style="list-style-type: none"> <li>○ Imbalances between <u>jmol</u> structures and text</li> <li>○ Good amount of information</li> <li>○ Reasonable use of format and font</li> </ul>	<ul style="list-style-type: none"> <li>○ Good balance between <u>jmol</u> structures and text</li> <li>○ Complete amount of information</li> <li>○ Format and font support message</li> </ul>	<ul style="list-style-type: none"> <li>○ Good balance between <u>jmol</u> structures and text</li> <li>○ Thorough coverage of both story and protein structure/function relationship</li> <li>○ Professional use of tutorial format</li> </ul>
			<b>Impact of tutorial on audience</b> <ul style="list-style-type: none"> <li>○ No concise points are made</li> <li>○ No impact on the viewer</li> </ul>	<ul style="list-style-type: none"> <li>○ Protein "story" or structure/ function relationship not clearly presented</li> <li>○ Little impact on the</li> </ul>	<ul style="list-style-type: none"> <li>○ Presents a clear protein "story" and relates function to structure</li> <li>○ Somewhat informative</li> </ul>	<ul style="list-style-type: none"> <li>○ Presents a clear and compelling protein "story" and relates function to structure</li> <li>○ Informative tutorial for</li> </ul>	<ul style="list-style-type: none"> <li>○ Presents a clear protein "story" that has relevance in society &amp; resonates with viewers</li> <li>○ Relationship between</li> </ul>



1. You incorporate information from your textbook into your presentation. Textbooks, reference books, etc. have at least one additional source properly cite ALL sources).

In order to make this presentation include McKee, T., & McKee, J. York: Oxford University Press.

Berg, J. M., Tymoczko, J. L., Stry Bergingstoke: W.H. Freeman & Nelson, D. L., & Cox, M. M. (200 Freeman and Co.

Ross, A. C., Caballero, B., & Cou Disease. Philadelphia: Wolters

These are all excellent sources than relying on more easily access the biochemistry or even get it really appreciate how you incorporate understanding of the pathway other presentations in terms of

2. You clearly show the relationship that we have studied in detail in transport chain/oxidative phos

- In future presentations, what would you do differently in terms of your delivery? Refer to evidence from your edited video.

I will definitely try not to read from the slides, this was awful, and I do not feel proud of it. I directly read the slides of the presentation instead of using my own words. This is one of the few times that happens to me and I think it was because I did not feel comfortable with the biochemistry terms. In the future I am planning to make notecards with the way terms should be pronounced. I will also make myself familiar with the terminology.

I appreciate your honest self assessment here, but I caution you against being too hard on yourself. This was, start to finish, a thoroughly researched and articulately presented exploration of protein digestion. You covered exactly what I would have covered in the most logical order I can imagine. You used excellent sources of biochemical information and clearly prepared very well for the presentation. I am glad you have identified something to work on in future presentations. In addition to allowing us to explore additional biochemical pathways, another goal of this assessment is to allow you to gain some experience having to talk in an educated way to a scientific audience about a complex biochemical topic. I don't expect students to be perfect, but I do hope that every student can identify areas for personal growth. You have done just that. Thank you for the very thorough and articulate presentation, and also for the honest self assessment. Congratulations on quite successfully completing this portion of the metabolism assessment.



# 9 Principles of Good Practice for Assessing Student Learning

1. The assessment of student learning begins with educational values.
2. Assessment is most effective when it reflects an understanding of learning as **multidimensional, integrated, and revealed in performance over time.**
3. Assessment works best when the programs it seeks to improve have **clear, explicitly stated purposes.**
4. Assessment requires attention to outcomes but also and equally to the **experiences that lead to those outcomes**
5. Assessment works best when it is **ongoing, not episodic.**

# 9 Principles of Good Practice for Assessing Student Learning

6. Assessment fosters wider improvement when representatives from across the educational community are involved.
7. Assessment makes a difference when it **begins with issues of use** and illuminates questions that people really care about.
8. Assessment is most likely to **lead to improvement** when it is part of a larger set of conditions that promote change.
9. Through assessment, **educators meet responsibilities to students and to the public.**



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# THANK YOU!

Questions or areas for further discussion?



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