



Creating Quantitative Assessment Data and Using it to Drive Change

Adapted from :
Getting What You Need Through Program Assessment
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OKLAHOMA CITY COMMUNITY COLLEGE



Effective Data

- ❖ **Addresses Actual Concerns of Stakeholders (faculty, staff and students)**
 - **Not HLC**
 - HLC does not know enough to ask the right questions for you
 - **Although HLC is nice too**

- ❖ **Can Be Used to Make Decisions**
 - **Is Clear**
 - **Is Longitudinal-Single Data Points are Meaningless**
 - **Is Important to Decision Makers**





Challenges

- ❖ **Stakeholders (faculty and decision makers) do not have enough time**
 - Teaching 15-21 credit hours is time consuming
 - Outcomes Assessment is just another form
 - Fire and forget
 - Have never seen worthwhile results

- ❖ **Stakeholders feel constrained**
 - To ask questions they are not interested in
 - Many “academics” have come to believe success in a course is indicated by further success in the field rather than what specific material is retained
 - Because what is learned is highly variable in higher ed
 - Because we do not always teach specific skills – like buttoning a shirt or installing a jet engine
 - By available resources
 - Because they are not expert in this kind of assessment





Student Learning Outcomes

Assessed every semester:

- ❖ **Students will be able to apply concepts, principles, and techniques of chemistry to solve chemically oriented problems.**
- ❖ **Students will be able to identify and apply standard chemical laboratory techniques to acquire and analyze empirical data that can be used to solve chemical problems.**
- ❖ **Students will be able to develop and support conclusions drawn from an analysis of data.**





Student Learning Outcomes

Assessed Twice in a 5-Year Period:

- ❖ **Students will be able to follow written laboratory procedures to safely and correctly complete a laboratory experiment.**





Outcome 1

Students will be able to apply concepts, principles, and techniques of chemistry to solve chemically oriented problems.

❖ **Measurement:**

- Departmental comprehensive final exam in all program courses
 - Covers key concepts, principles, and/or calculations for each program course or course sequence

❖ **Criteria for Success:**

- 80% of students should score 70% or higher on the exit assessment in all program courses.





Outcome 2

Students will be able to identify and apply standard chemical laboratory techniques to acquire and analyze empirical data that can be used to solve chemical problems.

❖ Measurement

- **Lab Practical: Organic I students solve a problem by applying standard lab techniques.**
 - **Students develop detailed procedure**
 - **Instructor does initial safety evaluation**
 - **Students complete lab procedures and acquire data**
 - **Students analyze data**
 - **Students draw conclusions and support using data**





Outcome 2 (cont.)

Students will be able to identify and apply standard chemical laboratory techniques to acquire and analyze empirical data that can be used to solve chemical problems.

❖ Criteria for Success:

- **At least 80% of the students will be able to identify and carry out appropriate techniques without redirection from the instructor.**





Outcome 3

Students will be able to develop and report conclusions drawn from an analysis of laboratory experiments.

❖ Measurement 1:

- Lab Practical in Organic I

❖ Criteria for Success:

- At least 80% of the students will be able to reach the correct conclusion from their collected data using the correct reasoning.





Outcome 3 (cont.)

Students will be able to develop and report conclusions drawn from an analysis of laboratory experiments.

❖ Measurement 2:

- Students in the General Chemistry sequence will be able to correctly identify an unknown compound and support their conclusions with data.

❖ Criteria for Success:

- At least 80% of students will be able to identify their unknown compound and properly use their data to write supporting statements in their conclusions.





Outcome 4

Students will be able to follow written laboratory procedures to safely and correctly complete a laboratory experiment.

❖ Measurement 1:

- Students in a program lab will work in pairs to complete a lab procedure.

❖ Criteria for Success:

- 80% of the students will be able to execute the procedure properly the first time.





Outcome 4 (cont.)

Students will be able to follow written laboratory procedures to safely and correctly complete a laboratory experiment.

❖ Measurement 2:

- **Safety check list**
 - **All courses**
 - **Group labs**
 - **Independent labs**

❖ Criteria for Success:

- **100% of the students will be able to complete a laboratory experiment without committing a safety violation.**





Outcome 4 (cont.)

Students will be able to follow written laboratory procedures to safely and correctly complete a laboratory experiment.

❖ Measurement 3:

- Instructor or outside observer uses check list to evaluate how well students follow a lab procedure.

❖ Criteria for Success:

- 80% of the students will be able to complete the experiment without requiring redirection or prompting from the instructor.





Results – Outcome 1

CHEM 1115 Sections and Students Assessed

For FY 2006

	# Sections Assessed	# Students Assessed
Overall	23	578
Full-time	7	197
Adjunct	16	381





Results – Outcome 1

CHEM 1115 Summary and Trend Data for Final Exam

	2006	2005	2004	2003
	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*
Overall	74.4	75.0	67.2	49.2
Full-time			-	-
Adjunct				

- **Benchmark:** $\geq 80\%$ of students will score 70% or higher on an exit assessment.





Results – Outcome 1

CHEM 1115 Summary and Trend Data for Final Exam

	2006	2005	2004	2003
	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*
Overall	74.4	75.0	67.2	49.2
Full-time	83.8	86.8	-	-
Adjunct	69.6	64.8		

•Benchmark: $\geq 80\%$ of students will score 70% or higher on an exit assessment.





Results – Outcome 1

CHEM 1215 Summary and Trend Data for Final Exam

For FY2006

	# Sections Assessed	# Students Assessed
Overall	9	197
Full-time	5	106
Adjunct	4	91





Results – Outcome 1

CHEM 1215 Summary and Trend Data for Final Exam

	2006	2005	2004	2003
	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*
Overall	56.9	60.9	73.7	69.5
Full-time			-	-
Adjunct			-	-

- **Benchmark:** $\geq 80\%$ of students will score 70% or higher on an exit assessment.





Results – Outcome 1

CHEM 1215 Summary and Trend Data for Final Exam

	2006	2005	2004	2003
	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*	% Meeting Criterion*
Overall	56.9	60.9	73.7	69.5
Full-time	80.2	83.9	-	-
Adjunct	29.7	49.1	-	-

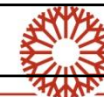
- **Benchmark:** $\geq 80\%$ of students will score 70% or higher on an exit assessment.





Results – Outcome 1

Chem 1115 – Error Analysis	% of Students Not Meeting Criteria with Error Described		
	2006	2005	2004
Problem Area			
Inorganic Nomenclature			
Incorrect formulas for common monatomic ions	19.5	30.3	
Incorrect formulas for common polyatomic ions	51.2	63.6	
Incorrect formula for sodium bicarbonate	70.7	84.8	84
Incorrect formula for metal hydroxide	70.7	66.7	76
Stoichiometry			
No attempt or wrong approach	22.0	30.3	
Incorrect grams to moles conversion (or vice versa)	8.5	39.4	48
Missing or incorrect stoichiometric ratio	17.1	27.3	





Results – Outcome 1

CHEM 1215 – Error Analysis	% of Students Not Meeting Criteria with Error Described		
	2006	2005	2004
Problem Area			
Inorganic Nomenclature			
Incorrect formula for sodium bicarbonate	63.6	100	80
Incorrect formula for common oxyacids	50.0	72	
Incorrect formula for metal hydroxide	27.3	56	40
Thermodynamic Quantities			
Incorrect units	27.3	40	55
Incorrectly predicted sign of entropy change	22.7	32	45
Wrong equation	27.7	27.3	





Summary of Outcome 1 Results

- ❖ **For CHEM 1115, there was a significant performance gap in sections taught by full time faculty versus sections taught by part-time adjunct instructors.**
- ❖ **For CHEM 1115, detailed analyses showed continuing weaknesses in areas such as the naming of compounds but some improved ability of otherwise failing students to set up some basic chemical calculations.**





Summary of Outcome 1 Results

- ❖ For CHEM 1215, there was an alarming performance gap in sections taught by full time faculty versus sections taught by part-time adjunct instructors.
- ❖ For CHEM 1215, detailed analyses showed a course change that placed review of nomenclature solely on students did not negatively impact performance in this area.





Results – Outcome 2

CHEM 2115 Lab Practical Results

Method Identification	Number of Students	% of Students
≥ 2 methods	69	76.7
1 method	19	21.1
0 methods	2	2.2
Date Reasonable		
Both methods	72	80.0
One method	17	18.9
None	1	1.1





Results – Outcomes 2 and 3

CHEM 2115 Lab Practical Results

Conclusions – Correctly identified unknown	Number of Students	% of Students
Completely supported	41	45.5
Incompletely supported	28	31.1
Incorrectly supported	2	2.2
Lucky guess	1	1.1
Conclusions – Incorrectly identified unknown		
Reasonable based on bad data	5	5.6
Narrowed down to small group using 1 data point	8	8.9
No clue	5	5.6





Results – Outcomes 2 and 3

A major problem revealed during the CHEM 2115 lab practical:

- ❖ Inability of students to properly support a conclusion with appropriate data (only 45.5% did so with an additional 5.6% making reasonable conclusions based upon bad data)





Results – Outcome 4

Summary of Results of Spring 2006 Safety Audit

	Group Labs	IP Labs
Goggles not worn properly	12	6
Reagents left in balance room / area	16	3
Equipment left in balance room / area	21	16
Total students attending labs during audits	145	19
Total number of safety violations	86	29
Total violations per student	0.59	1.53





Results

A major fear confirmed by safety audits:

- ❖ **Students doing labs independently (i.e. with less supervision) worked less safely in the lab (1.53 violations/student vs. 0.59 violations/group lab student)**

This paralleled an earlier finding:

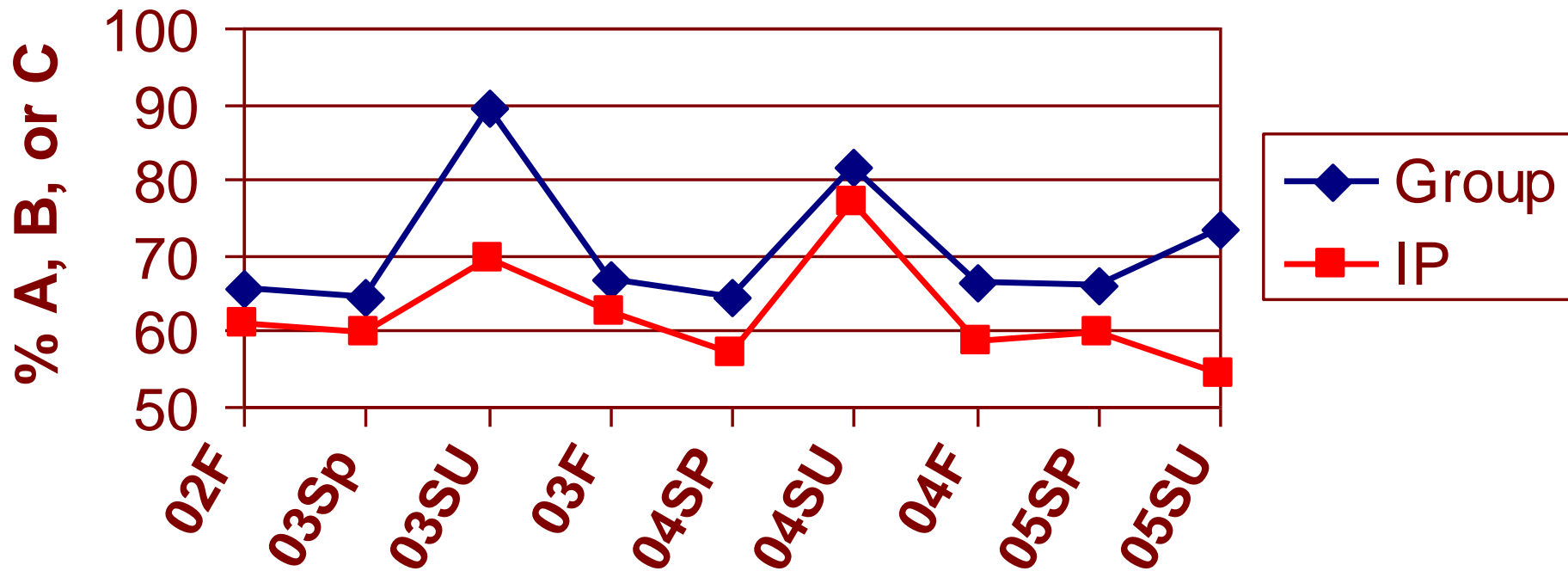
- ❖ **The success rate in the course overall is lower for IP students than for Group Lab students.**





Results

CHEM 1115 Successful Completion Group vs. IP Lab





The Next Step in the Process

What to do with all this data?

Option 1: Put it in a report that gets filed in a deep, dark drawer somewhere until HLC asks for it.





The Next Step in the Process

Option 2: Use the data as a guide to help us improve the program.

**Close
the
Loop!**





Closing the Loop

- 1. Chemistry faculty started continually re-visiting/retesting key concepts.**
- 2. Adjuncts were educated on the assessment process and the importance of re-visiting/retesting key concepts.**
- 3. Chemistry faculty modified labs to require students to draw conclusions and support those conclusions adequately.**





Closing the Loop

- 4. Chemistry faculty approached the Dean about how program quality was being impacted by too few full time faculty.**
- 5. Chemistry faculty approached the Dean about how student success and safety was impacted by independent labs.**
- 6. The Dean was able to take our data to the VP/Provost to get...**





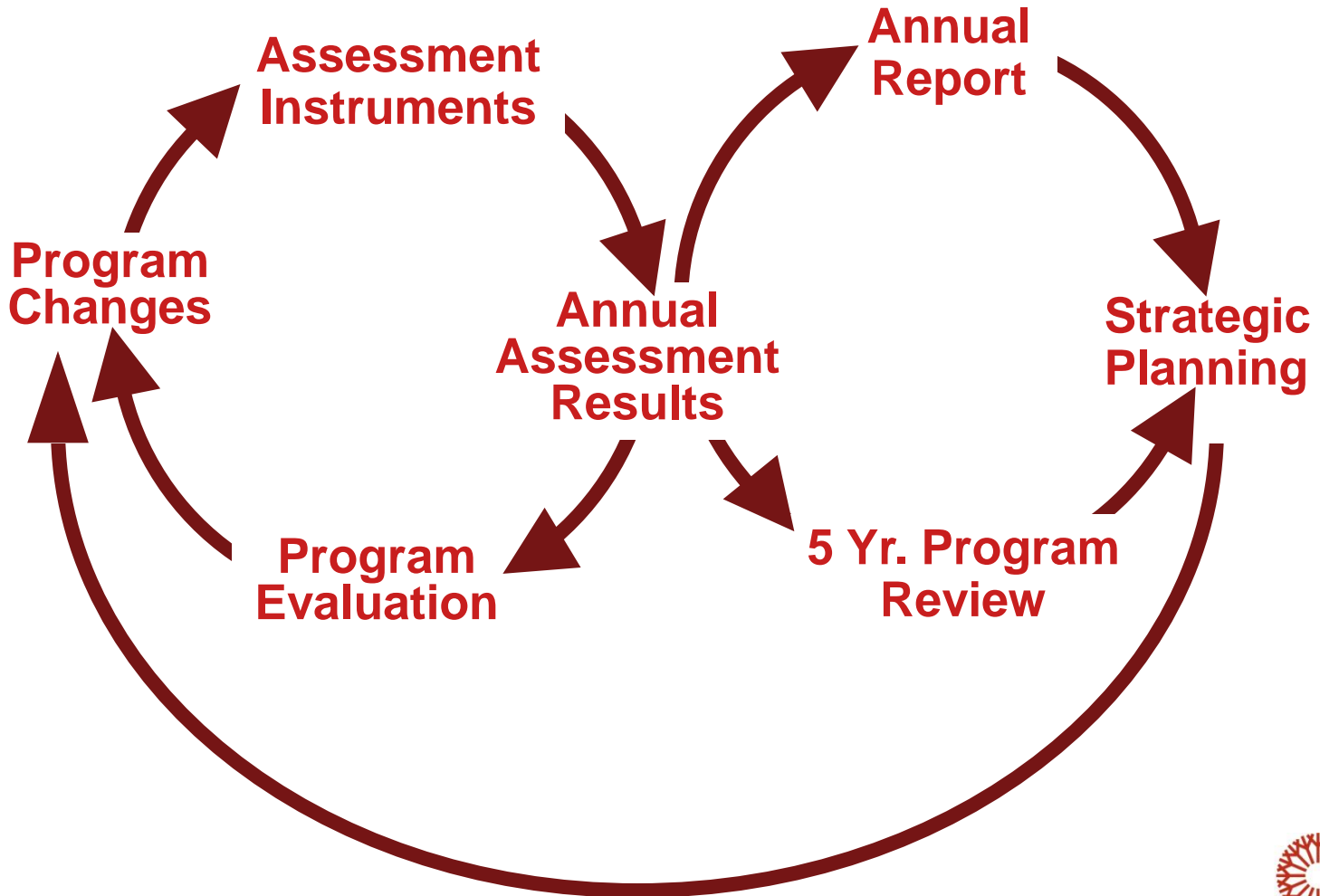
Closing the Loop

- ❖ **A new full time chemistry faculty member who started August 2006.**
- ❖ **Approval to move to all group labs starting in Fall 2007.**





The Assessment Cycle





“Leadership” and Outcomes Assessment

- ❖ **Original Message – This is easy, don’t worry about it...**
 - **The wrong message**
 - **Expectations too low**
 - **This will go away**
 - **The target keeps changing**

- ❖ **This is Faculty Driven**
 - **Training, training, training**
 - **Oversite by committee**

- ❖ **This is Dean Driven**
 - **Lovely**





Assessment Hierarchy

