2014-2015 Annual Assessment Report Template

FOR GRADUATE AND CREDENTIAL PROGRAMS: THIS TEMPLATE REFERS TO SAC STATE BACCALAUREATE LEARNING GOALS. PLEASE IGNORE THESE REFERENCES IN YOUR REPORT.

Question 1: Program Learning Outcomes

Q1.1. Which of the following Program Learning Outcomes (PLOs) and Sac State Baccalaureate Learning Goals (BLGs) **did you assess in 2014-2015**? **[Check all that apply]**

- 1. Critical thinking
- X 2. Information literacy
- X 3. Written communication
- X 4. Oral communication
- X 5. Quantitative literacy
- X 6. Inquiry and analysis
- 7. Creative thinking
- 8. Reading
- 9. Team work
- X 10. Problem solving
- 11. Civic knowledge and engagement
- 12. Intercultural knowledge and competency
- 13. Ethical reasoning
- X 14. Foundations and skills for lifelong learning
- 15. Global learning
- X 16. Integrative and applied learning
- 17. Overall competencies for GE Knowledge
- 18. Overall competencies in the major/discipline
- X 19. Other, specify any PLOs that were assessed in 2014-2015 but not included above:
  - a. Laboratory Skills
  - b.
  - c.

Q1.3. Are your PLOs closely aligned with the mission of the university?

- X 1. Yes
- 2. No
- 3. Don't know

Q1.4. Is your program externally accredited (other than through WASC)?

- 1. Yes
- X 2. No (Go to **Q1.5**)
- 3. Don't know (Go to **Q1.5**)

Q1.4.1. If the answer to Q1.4 is yes, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?

- 1. Yes
- 2. No
- 3. Don't know

Q1.5. Did your program use the *Degree Qualification Profile* (DQP) to develop your PLO(s)?

- 1. Yes
- X 2. No, but I know what the DQP is
- 3. No, I don't know what the DQP is.
- 4. Don't know

Q1.6. Did you use action verbs to make each PLO measurable (See Attachment I)? Yes. E>g. synthesize (compounds), demonstrate (lab skills, perform (measurements), use (information technology), interpret (molecular models), solve (problems), etc.

Q1.2. Please provide more detailed background information about **EACH PLO** you checked above and other information such as how your specific PLOs were **explicitly** linked to the Sac State BLGs:

Q1.2.1. Do you have rubrics for your PLOs?

- 1. Yes, for all PLOs
- X 2. Yes, but for some PLOs
- 3. No rubrics for PLOs

N/A, other (please specify):

Learning Outcome	Q 1.1	Measurement tool	Evaluation
A. Laboratory Knowledge and Skills			
1. the basic analytical and technical skills to work effectively in the various fields of chemistry	19	Capstone project	Multiple faculty evaluation during department poster session
2. the ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.	5, 16,	Capstone project	Multiple faculty evaluation during department poster session
3. the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.		Not assessed at program level	N/A
4. the ability to use information technology tools such as the Internet and computer-based literature searches as well as printed literature resources to locate and retrieve scientific information needed for laboratory or theoretical work.	2, 19	Capstone project	Multiple faculty evaluation during department poster session
5. the ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats.	3, 4	Capstone project	Multiple faculty evaluation during department poster session
6. knowledge and understanding of the issues of safety regulations in the use of chemicals in their laboratory work.		Not assessed at program level	N/A
B. Computer, Library and Information Skills			
1. the ability to make effective use of the library and other information resources in chemistry, including the primary literature, tabulated data, and secondary sources such as the Internet.	2	Capstone project	Multiple faculty evaluation during department poster session
2. the ability to make effective use of computers in chemistry applications using standard and chemistry specific software packages.		Capstone project	Multiple faculty evaluation during department poster session
3.the ability to perform and interpret simple molecular modeling or chemical computations using standard software		Not assessed at program level	N/A
C. Oral and Written Communication Skills in Chemistry			
1. adequate skills in technical writing and oral presentations.	2, 3	Capstone project	Multiple faculty evaluation during department poster session
2. the ability to communicate scientific information in oral and written formats to both scientists and nonscientists.	2, 3	Capstone project	Multiple faculty evaluation during department poster session
D.Quantitative Reasoning Skills			
1. ability to accurately collect and interpret numerical data.	5, 6, 10	Capstone project	Multiple faculty evaluation during department poster session
2.ability to solve problems competently using extrapolation, approximation, precision, accuracy, rational estimation and statistical validity.	5, 6, 10	Capstone project	Multiple faculty evaluation during department poster session
3.proficiency in the scientific method (formulating hypotheses and arriving at appropriate answers and conclusions)	6, 10	Capstone project	Multiple faculty evaluation during department poster session
E. Knowledge of Chemical Principles and Facts			

IN QUESTIONS 2 THROUGH 5, REPORT IN DETAIL ON ONE PLO THAT YOU ASSESSED IN 2014-2015

Question 2: Standard of Performance for the selected PLO

Q 2.1. Specify one PLO here as an example to illustrate how you conducted assessment (be sure you checked the correct box for this PLO in Q1.1):
Assessed laboratory skills as given by PLO A (Q1.2 above).

Q2.2. Has the program developed or adopted **explicit** standards of performance for this PLO?

1. Yes
X 2. No
3. Don't know
4. N/A

Q2.3. **Please provide the rubric(s)** and standard of performance that you have developed for this PLO here or in the appendix: **[Word limit: 300]**

The faculty use a common rubric containing 10 questions to assess capstone poster projects. We believe all of the questions pertain to PLO A.

Overall the student's presentation shows that the student:

1. demonstrates effective organization of their poster (shows effectively the problem and how problem was attacked

and solved)

2. demonstrates effective use of graphs and other visual aids

3. uses effective writing (good grammar, spelling, coherent writing, clear exposition)

4. shows an ability to use instrumentation useful in solving or doing problem

5. collected reasonable data useful in solving or doing the problem

6. uses literature properly in presentation

7. supports their generalizations and conclusions with adequate and sound evidence

8. uses technical vocabulary correctly

9. demonstrates effective learning of several laboratory skills

Q2.4. Please indicate the category in which the selected PLO falls into.

1. Critical thinking
X 2. Information literacy
X 3. Written communication
X 4. Oral communication
X 5. Quantitative literacy
X 6. Inquiry and analysis
7. Creative thinking
8. Reading
9. Team work
X 10. Problem solving
11. Civic knowledge and engagement
12. Intercultural knowledge and competency
13. Ethical reasoning
X 14. Foundations and skills for lifelong learning
15. Global learning
X 16. Integrative and applied learning
17. Overall competencies for GE Knowledge
18. Overall competencies in the major/discipline
19. Other: Laboratory skills

Please indicate where you have published the PLO, the standard of performance, and the rubric that measures the PLO:	**Q2.5** **(1) PLO**	**Q2.6** **(2) Standards of Performance**	**Q2.7** **(3) Rubrics**
1. In **SOME** course syllabi/assignments in the program that address the PLO			
2. In **ALL** course syllabi/assignments in the program that address the PLO			
3. In the student handbook/advising handbook			
4. In the university catalogue			

5. On the academic unit website or in newsletters			
6. In the assessment or program review reports, plans, resources or activities	X	X	X
7. In new course proposal forms in the department/college/university	X	X	X
8. In the department/college/university's strategic plans and other planning documents			
9. In the department/college/university's budget plans and other resource allocation documents			

10. Other, specify:

Question 3: Data Collection Methods and Evaluation of Data Quality for the Selected PLO

Q3.1. Was assessment data/evidence **collected** for the selected PLO in 2014-2015?

X 1. Yes
2. No (Skip to **Q6**)
3. Don't know (Skip to **Q6**)
4. N/A (Skip to **Q6**)

Q3.2. If yes, was the data **scored/evaluated** for this PLO in 2014-2015?

X 1. Yes
2. No (Skip to **Q6**)
3. Don't know (Skip to **Q6**)
4. N/A (Skip to **Q6**)

Q3.1A. How many assessment tools/methods/measures **in total** did you use to assess this PLO?

One - rubric for capstone poster projects

Q3.2A Please describe how you collected the assessment data for the selected PLO. For example, in what course(s) or by what means were data collected (see Attachment II)? **[Word limit: 300]**

Students present laboratory capstone research projects in a department-wide poster session. Faculty attend and use a common rubric to score the posters.

Q3A: Direct Measures (key assignments, projects, portfolios)

Q3.3. Were direct measures [key assignments, projects, portfolios, etc.] used to assess this PLO?

X 1. Yes
2. No (Go to **Q3.7**)
3. Don't know (Go to **Q3.7**)

Q3.3.2. Please attach the direct measure you used to collect data.

Q3.3.1. Which of the following direct measures were used? **[Check all that apply]**

X 1. Capstone projects (including theses, senior theses), courses, or experiences
2. Key assignments from required classes in the program
3. Key assignments from elective classes
4. Classroom based performance assessments such as simulations, comprehensive exams, critiques
5. External performance assessments such as internships or other community based projects
6. E-Portfolios
7. Other portfolios
8. Other measure. Specify:

Q3.4. How was the data evaluated? **[Select only one]**

1. **No** rubric is used to interpret the evidence (Go to **Q3.5**)
2. Used rubric developed/modified by the faculty who teaches the class

X 3. Used rubric developed/modified by a group of faculty

4. Used rubric pilot-tested and refined by a group of faculty
5. The VALUE rubric(s)
6. Modified VALUE rubric(s)
7. Used other means. Specify:

Q3.4.1. Was the direct measure (e.g. assignment, thesis, etc.) aligned directly	**Q3.4.2.** Was the direct measure (e.g. assignment, thesis, etc.) aligned directly	**Q3.4.3.** Was the rubric aligned directly and explicitly with the PLO?

and explicitly with the PLO? X 1. Yes 2. No 3. Don't know 4. N/A	and explicitly with the rubric? X 1. Yes 2. No 3. Don't know 4. N/A	X 1. Yes 2. No 3. Don't know 4. N/A

Q3.5. How many faculty members participated in planning the assessment data collection of the selected PLO? The department discussed and agreed on the assessment process.	**Q3.5.1. If** the data was evaluated by multiple scorers, was there a norming process (a procedure to make sure everyone was scoring similarly)? 1. Yes X 2. No 3. Don't know
Q3.6. How did you **select** the sample of student work [papers, projects, portfolios, etc.]? Faculty randomly select the posters they will evaluate. The faculty member places a sticker on the poster to show it is been evaluated to ensure a wide range of posters will be evaluated. There are usually ~60 posters being evaluated by ~10 faculty. Not all posters will be evaluated.	**Q3.6.1.** How did you **decide** how many samples of student work to review? We decided it was reasonable to ask faculty to review three posters. In recent years, though, I have asked faculty to review five.

Q3.6.2. How many students were in the class or program? There are about 120 students total enrolled in the capstone project classes each year. Students usually work in teams of 2.	**Q3.6.3.** How many samples of student work did you evaluate? 44 (about 30%)	**Q3.6.4.** Was the sample size of student work for the direct measure adequate? 1. Yes 2. No X 3. Don't know

Q3B: Indirect Measures (surveys, focus groups, interviews, etc.)

Q3.7. Were indirect measures used to assess the PLO? 1. Yes X 2. No (Skip to **Q3.8**) 3. Don't know	**Q3.7.1.** Which of the following indirect measures were used? **[Check all that apply]** 1. National student surveys (e.g., NSSE) 2. University conducted student surveys (e.g. OIR) 3. College/Department/program student surveys 4. Alumni surveys, focus groups, or interviews 5. Employer surveys, focus groups, or interviews 6. Advisory board surveys, focus groups, or interviews 7. Other, specify:
Q3.7.2 If surveys were used, how was the sample size decided?	
Q3.7.3. If surveys were used, briefly specify how you selected your sample.	**Q3.7.4. If** surveys were used, what was the response rate?

Q3C: Other Measures (external benchmarking, licensing exams, standardized tests, etc.)

Q3.8. Were external benchmarking data such as licensing exams or standardized tests used to assess the PLO? 1. Yes X 2. No (Go to **Q3.8.2**) 3. Don't know	**Q3.8.1.** Which of the following measures were used? 1. National disciplinary exams or state/professional licensure exams 2. General knowledge and skills measures (e.g., CLA, CAAP, ETS PP, etc.) 3. Other standardized knowledge and skill exams (e.g., ETS, GRE, etc.) 4. Other, specify:

Q3.8.2. Were other measures used to assess the PLO? 1. Yes X 2. No (Go to **Q3.9**) 3. Don't know (Go to **Q3.9**)	**Q3.8.3.** If other measures were used, please specify:

Q3D: Alignment and Quality

Q3.9. Did the data, including the direct measures, from all the different assessment tools/measures/methods directly align with the PLO? X 1. Yes 2. No 3. Don't know	**Q3.9.1.** Were **ALL** the assessment tools/measures/methods that were used good measures for the PLO? X 1. Yes 2. No 3. Don't know

Question 4: Data, Findings and Conclusions

Q4.1. Please provide simple tables and/or graphs to summarize the assessment data, findings, and conclusions: (see Attachment III) **[Word limit: 600 for selected PLO]**

A. ACS EXAM DATA

2014-2015 ACS exam results

Course	Area	Class level	# sections	Percentile	2009-2014 average
Chem 124	Organic chem	Soph/Jr	4	53	54
Chem 110	Inorganic chem	Mostly Sr	1	51	76
Chem 160B	Biochem	Jr/Sr	1	53	48

ACS exam data included for interest. Does not pertain to selected PLO.

B. CAPSTONE PROJECT DATA for PLO A

Table 1. Capstone poster project results for F14-S15

	110L - BSCH	125 - BSCH	125 - BSBC	125 - BAFR	125 - BANC	133 - BSCH	141 - BSBC	141 - BSCH	141 - BANC	141 - BAFR	164 - BAFR	164 - BABC	164 - BSBC
	N = 4	N = 5	N = 10	N = 3	N = 2	N = 5	N = 8	N = 9	N = 2	N = 2	N = 2	N = 6	N = 4
1	5	4.8	4.50	4.67	5	4.6	4.63	4.56	5	4.5	4.75	4.50	4.25
2	5	4.6	4.60	5.00	5	4.6	4.63	4.50	5	4.5	4.50	4.17	4.50
3	4.5	4.4	4.30	4.33	5	4.6	4.63	4.67	5	4.5	4.50	4.33	4.50
4	5	4.6	4.60	5.00	5	4.2	4.38	4.78	4.5	5	4.50	4.17	4.50
5	4.75	4.6	4.70	5.00	5	4.8	4.56	4.67	4.5	4.5	4.50	4.50	4.50
6	4.25	3.8	4.30	4.33	5	4.6	4.63	4.11	5	4.5	4.00	4.33	4.50
7	4.75	4.8	4.05	4.67	5	4.2	4.63	4.44	5	4	4.00	4.17	3.75
8	5	4.2	4.50	4.33	5	4.2	4.50	4.56	5	4	4.00	3.83	4.25
9	5	4.8	4.90	4.67	5	4.2	4.38	4.56	5	4.5	5.00	4.33	4.50
avg 1-9	4.805556	4.51111	4.49444	4.66667	5	4.44444	4.55222	4.53889	4.88889	4.444444	4.4167	4.2589	4.36111
10*	**4.825**	**4**	**4.00**	**4.60**	**6**	**3.8**	**4.50**	**4.30**	**4.6**	**4**	**4.26**	**3.67**	**4.00**

combined semesters

This is the first year we have evaluated student's according to degree program. All of our past data was collected without identifying students' degree program and reflects student performance for the department as a whole. There is not enough data yet to make any real conclusions about student performance by degree program; the N's involved in this data are to small to lend any significance. We can use this data to make a few conclusions, though. First, average performance in each of the 9 questions for the PLO (see Question 2.3 for the rubric items) is above 4 (out of 5), similar to previous semesters. Second, students in Chem 110L scored the highest, also similar to previous semesters. Students taking this course have already had a least one and often two or even three previous capstone courses (BS Chem students take four capstone courses). This experience we believe translates into the high performances we see in 110L. Third, the students in the BABC track had the lowest scores of all, occurring in Chem 164. We believe this is explained by the fact that these students take only Chem 164 as a capstone course; all other students will have at least one additional capstone. Finally, there are no obvious trends in the performance by rubric number, except perhaps for Chem 125, where students scored low on # 3, written communication. Five-year data for the department (see Department of Chemistry 2014 Self-Study) revealed written communication as one of the weaker areas of performance in PLO A. Faculty recognize the value of earlier and more frequent writing assignments and have discussed how to add this to an already jam-packed curriculum.

Q4.2. Are students doing well and meeting program standard? If not, how will the program work to improve student performance of the selected PLO?

Generally students are doing well. Most faculty feel that students' writing could be better.

Q4.3. For **selected** PLO, the student performance:

1. **Exceeded** expectation/standard
2. **Met** expectation/standard
3. **Partially** met expectation/standard
4. **Did not meet** expectation/standard
5. No expectation or standard has been specified
6. Don't know

Although we don't have an explicit expectation, if the average is 4 out of 5, we're generally pretty satisfied that students are learning the laboratory skills we want them to learn.

Question 5: Use of Assessment Data (Closing the Loop)

Q5.1. As a result of the **assessment effort in 2014-2015** and based on the prior feedback from OAPA, do you anticipate making any changes for your program (e.g., course structure, course content, or modification of PLOs)?

1. Yes
2. No (Go to **Q6**)
3. Don't know (Go to **Q6**)

Q5.1.2. Do you have a plan to assess the impact of the changes that you anticipate making?

1. Yes
2. No - not yet
3. Don't know

Q5.1.1. Please describe what changes you plan to make in your program as a result of your assessment of this PLO. Include a description of how you plan to assess the impact of these changes. **[Word limit: 300 words]**

We have been running the same assessment tools for over a decade. Although I feel we have been getting useful information in our assessment process, we are not really learning anything new. I would like to change directions and have the department work on core concepts that relate to our PLO's that we can track throughout the curriculum. This would be a long-term project that would probably not result in immediate changes to our current assessment process. My goal for 2015-2016 is for the department to identify core concepts that we can track through ACS exams and capstone projects. Thus, we would use the same tools but we would get more, and hopefully more actionable, information from these tools.

Q5.2. How have the assessment data from last year (**2013 - 2014**) been used so far? **[Check all that apply]**

	(1) Very Much	**(2)** Quite a Bit	**(3)** Some	**(4)** Not at all	**(8)** N/A
1. Improving specific courses			**X**		
2. Modifying curriculum				**X**	
3. Improving advising and mentoring				**X**	
4. Revising learning outcomes/goals				**X**	
5. Revising rubrics and/or expectations			**X**		
6. Developing/updating assessment plan			**X**		
7. Annual assessment reports		**X**			
8. Program review	**X**				
9. Prospective student and family information					**X**
10. Alumni communication				**X**	
11. WASC accreditation (regional accreditation)				**X**	
12. Program accreditation				**X**	
13. External accountability reporting requirement					**X**
14. Trustee/Governing Board deliberations					**X**
15. Strategic planning		**X**			
16. Institutional benchmarking					**X**
17. Academic policy development or modification			**X**		
18. Institutional Improvement			**X**		
19. Resource allocation and budgeting			**X**		
20. New faculty hiring			**X**		
21. Professional development for faculty and staff				**X**	
22. Recruitment of new students				**X**	

23. Other Specify: Assessment has become tied to strategic planning for growth in the major. I used this information quite a bit in our 2014 Self-Study.

Q5.2.1. Please provide a detailed example of how you used the assessment data above.

I used it extensively in our 2014 Academic Program Review. I also used it to direct department discussion throughout the year on a number of topics including major growth and resource allocations.

Additional Assessment Activities

Q6. Many academic units have collected assessment data on aspects of a program that are not related to PLOs (i.e., impacts of an advising center, etc.). **If** your program/academic unit has collected data on the program elements, please briefly report your results here. **[Word limit: 300]**

Q7. What PLO(s) do you plan to assess next year?

1. Critical thinking
2. Information literacy
3. Written communication
4. Oral communication
5. Quantitative literacy
6. Inquiry and analysis
7. Creative thinking
8. Reading
9. Team work
10. Problem solving
11. Civic knowledge and engagement
12. Intercultural knowledge and competency
13. Ethical reasoning
14. Foundations and skills for lifelong learning
15. Global learning
16. Integrative and applied learning
17. Overall competencies for GE Knowledge
18. Overall competencies in the major/discipline
19. Other, specify any PLOs that were assessed in 2014-2015 but not included above:

a.
b.

This is pending some department discussion about changes to our assessment process.

Q8. Have you attached any appendices? If yes, please list them all here:

Program Information

P1. Program/Concentration Name(s):
BS Chemistry, BS Biochemistry, BA Chemistry, BA Chemistry (Forensics), BA Chemistry (Biochemistry)

P1.1. Report Authors:
Linda Roberts

P2. Program Director:
Linda Roberts

P2.1. Department Chair:
Linda Roberts

P3. Academic unit: Department, Program, or College:
Chemistry

P4. College:
NSM

P5. Fall 2014 enrollment for Academic unit *(See Department Fact Book 2014 by the Office of Institutional Research for fall 2014 enrollment:* 461
Note, this number is already extremely out of date. July 2015 major count is 713.

P6. Program Type: **[Select only one]**
1. Undergraduate baccalaureate major
2. Credential
3. Master's degree
4. Doctorate (Ph.D./Ed.d)
5. Other. Please specify:

Undergraduate Degree Program(s):
P7. Number of undergraduate degree programs the academic unit has: 5

P7.1. List all the name(s): See P1 above

P7.2. How many concentrations appear on the diploma for this undergraduate program? 3

Master Degree Program(s):
P8. Number of Master's degree programs the academic unit has: 2

P8.1. List all the name(s): Master of Science in Chemistry, Master of Science in Chemistry (Biochemistry)

P8.2. How many concentrations appear on the diploma for this master program? 1

Credential Program(s):
P9. Number of credential programs the academic unit has: 0
P9.1. List all the names:

Doctorate Program(s)
P10. Number of doctorate degree programs the academic unit has: 0

P10.1. List all the name(s):

When was your assessment plan?	1. Before 2007-08	2. 2007-08	3. 2008-09	4. 2009-10	5. 2010-11	6. 2011-12	7. 2012-13	8. 2013-14	9. 2014-15	10. No formal plan
P11. Developed	X									
P12. Last updated									X	

1. Yes	2. No	3. Don't Know

P13. Have you developed a curriculum map for this program?		X	
P14. Has the program indicated explicitly where the assessment **of student learning** occurs in the curriculum?	X		
P15. Does the program have any capstone class?	X		
P16. Does the program have **ANY** capstone project?	X		

Assessing Other Program Learning Outcomes (Optional)

If your program assessed PLOs not reported above, please summarize your assessment activities in the table below. If you completed part of the assessment process, but not the full process (for example, you revised a PLO and developed a new rubric for measuring it), then put N/A in any boxes that do not apply.

Report Assessment Activities on Additional PLOs Here
See included ACS data from Q4.1 above.

Q1: Program Learning Outcome (PLO)	Q2: Standard of Performance/ Target Expectation	Q3: Methods/ Measures (Assignments)	Q4: Data/Findings/ Conclusions	Q5: Use of Assessment Data/ Closing the Loop

Example: Educational Technology (iMet), MA

Q1: Program Learning Outcome (PLO)	Q2: Standard of Performance/ Target Expectation	Q3: Methods/ Measures (Assignments)	Q4: Data/Findings/ Conclusions	Q5: Use of Assessment Data/ Closing the Loop
<u>Critical Thinking Skills</u> 6.1 Explanation of issues 6.2 Evidence 6.3 Influence of context and assumptions 6.4 Student's position 6.5 Conclusions and related outcomes (See Critical Thinking Rubric and data tables on Next Page)	Seventy percent (70 %) of our students will score 3.0 or above in all five dimensions using the VALUE rubric by the time they graduate from the four semester program.	Culminating Experience Projects: Master's Thesis	Students meet the standards of 6.1 (92%), 6.4 (77%) and 6.5 (69%). Students do not meet the standards of 6.2 (61%) and 6.3 (61%). **Students meet some of our Critical Thinking standards.** <u>The areas needing improvement</u>: 1). 6.2: Evidence (61%) 2). 6.3: Influence of context and assumptions (61%).	In order to help students in our program successfully become critical thinking researchers, we will design more classroom activities and assignments related to: 1). Re-examination of evidence (6.2) and context and assumptions (6.3) in the research 2). Require students to apply these skills as they compose comprehensive responses for all their assignments.

Example: Chemistry BS/BA

Students will quantitatively determine the composition of chemical unknowns through the use of classical and modern analytical techniques and instrumentation.	Target performance for this assessment was that 50% of students would demonstrate "mastery" (i.e., reported values within 0.5% of the true value) and 75% of students would demonstrate "proficiency" (i.e., reported values within 1.0% of the true value).	Students were provided with nine chemical samples and quantitatively analyzed each unknown to determine their respective weight percent of chloride in a solid.	Findings were 44% mastery and 56% proficiency.	To close the loop, faculty has implemented additional opportunities for practice and achievement in analytical techniques and methodology in two core courses.

Additional PLOs

PLO				
PLO				
PLO				

Attachment I: The Development of Program Learning Outcomes

The Importance of Verbs

Multiple Interpretations:	**Fewer Interpretations:**
to grasp	to write
to know	to recite
to enjoy	to identify
to believe	to construct
to appreciate	to solve
to understand	to compare

Relevant Verbs in Defining Learning Outcomes

(Based on Bloom's Taxonomy)

Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Cite	Arrange	Apply	Analyze	Arrange	Appraise
Define	Classify	Change	Appraise	Assemble	Assess
Describe	Convert	Compute	Break Down	Categorize	Choose
Identify	Describe	Construct	Calculate	Collect	Compare
Indicate	Defend	Demonstrate	Categorize	Combine	Conclude
Know	Diagram	Discover	Compare	Compile	Contrast
Label	Discuss	Dramatize	Contrast	Compose	Criticize
List	Distinguish	Employ	Criticize	Construct	Decide
Match	Estimate	Illustrate	Debate	Create	Discriminate
Memorize	Explain	Interpret	Determine	Design	Estimate
Name	Extend	Investigate	Diagram	Devise	Evaluate
Outline	Generalize	Manipulate	Differentiate	Explain	Explain
Recall	Give Examples	Modify	Discriminate	Formulate	Grade
Recognize	Infer	Operate	Distinguish	Generate	Interpret
Record	Locate	Organize	Examine	Manage	Judge
Relate	Outline	Practice	Experiment	Modify	Justify
Repeat	Paraphrase	Predict	Identify	Organizer	Measure
Reproduce	Predict	Prepare	Illustrate	Perform	Rate
Select	Report	Produce	Infer	Plan	Relate
State	Restate	Schedule	Inspect	Prepare	Revise
Underline	Review	Shop	Inventory	Produce	Score
	Suggest	Sketch	Outline	Propose	Select
	Summarize	Solve	Question	Rearrange	Summarize
	Translate	Translate	Relate	Reconstruct	Support
		Use	Select	Relate	Value
			Solve	Reorganize	
			Test	Revise	

Attachment II: Simplified Annual Assessment Report

Basic Assessment

Q1. Program Learning Outcome	**Q2.** Standards of Performance/Target Expectations	**Q3.** Methods/ Measures (Assignments) and Surveys	**Q4.** Data/Findings/ Conclusion	**Q5.** Use of Assessment Data/ Closing the Loop

Examples:

Chemistry, BS/BA

(Example of Content Knowledge)

PLO 1: Students will quantitatively determine the composition of chemical unknowns through the use of classical and modern analytical techniques and instrumentation.	Target performance for this assessment was that 50% of students would demonstrate "mastery" (i.e., reported values within 0.5% of the true value) and 75% of students would demonstrate "proficiency" (i.e., reported values within 1.0% of the true value).	Students were provided with nine chemical samples and quantitatively analyzed each unknown to determine their respective weight percent of chloride in a solid.	Findings were 44% mastery and 56% proficiency.	To close the loop, faculty has implemented additional opportunities for practice and achievement in analytical techniques and methodology in two core courses.

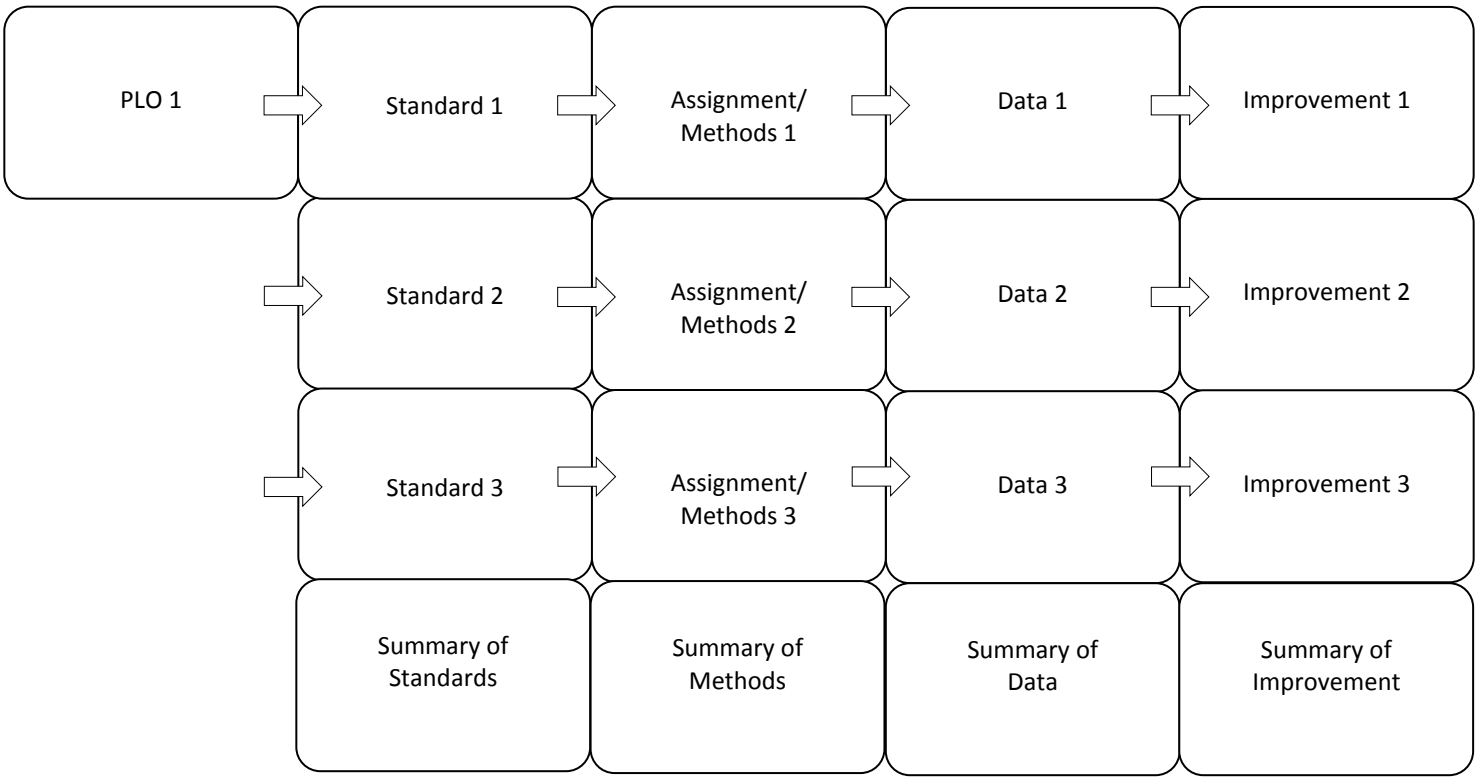
Educational Technology (iMet), MA

(Example of Complicated Skills)

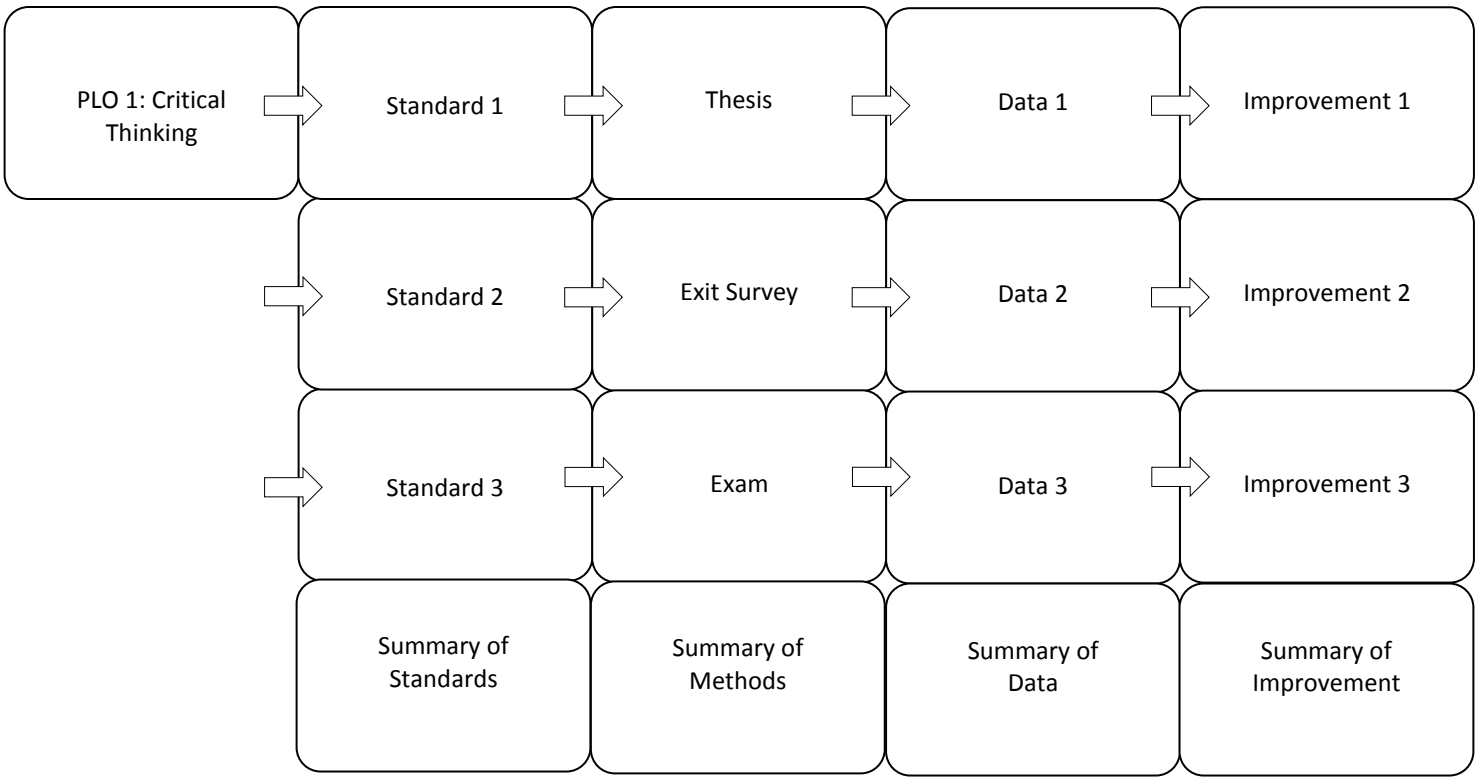
PLO 1: <u>Critical Thinking Skills</u> **6.1** Explanation of issues **6.2** Evidence **6.3** Influence of context and assumptions **6.4** Student's position **6.5** Conclusions and related outcomes (See Appendix III)	Seventy percent (70 %) of our students will score 3.0 or above in all five dimensions using the VALUE rubric by the time they graduate from the four semester program.	Culminating Experience Projects: Master's Thesis	Students *meet* the standards 6.1 (92%), 6.4 (77%) and 6.5 (69%). Students *do not* meet the standards 6.2 (61%) and 6.3 (61%). **Students meet some of our Critical Thinking standards.** <u>The areas needing improvement</u>: 1). 6.2: Evidence (61%) 2). 6.3: Influence of context and assumptions (61%).	In order to help students in our program successfully become critical thinking researchers, we will design more classroom activities and assignments related to: 1). Re-examination of evidence (6.2) and context and assumptions (6.3) in the research 2). Require students to apply these skills as they compose comprehensive responses for all their assignments.

Assessment Flowchart – Multiple Methods

One PLO Assessed by Multiple Assignments

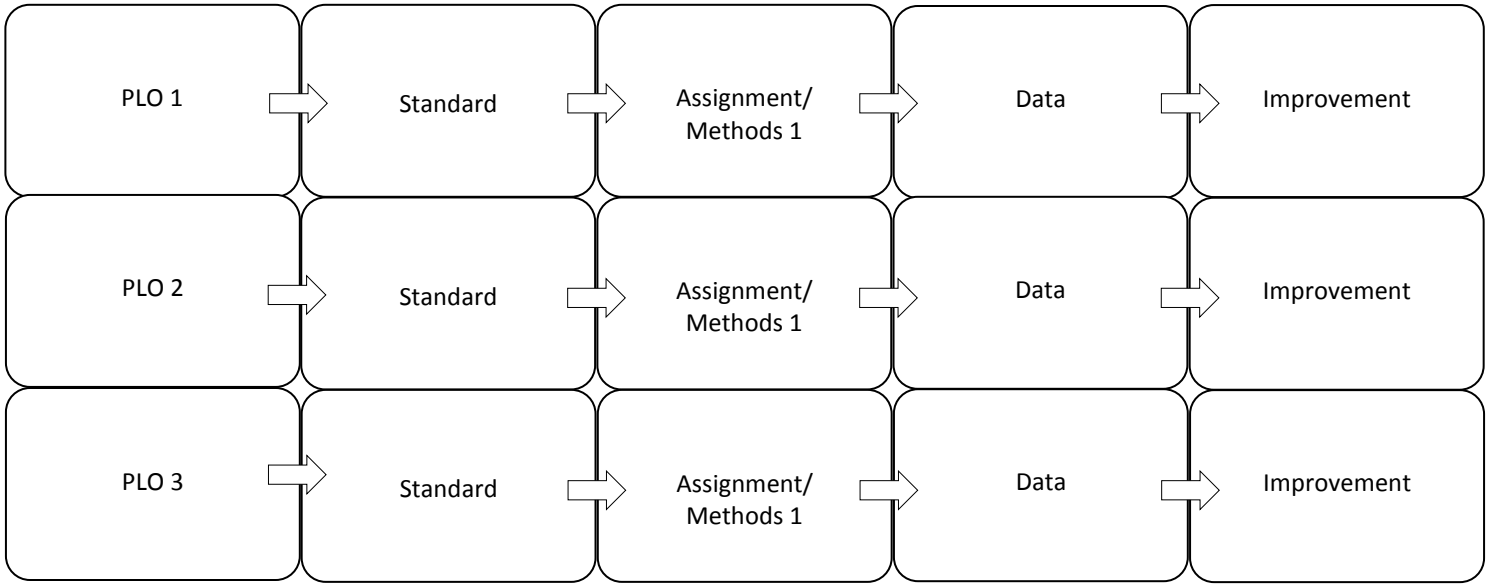


Multiple-Methods Example:

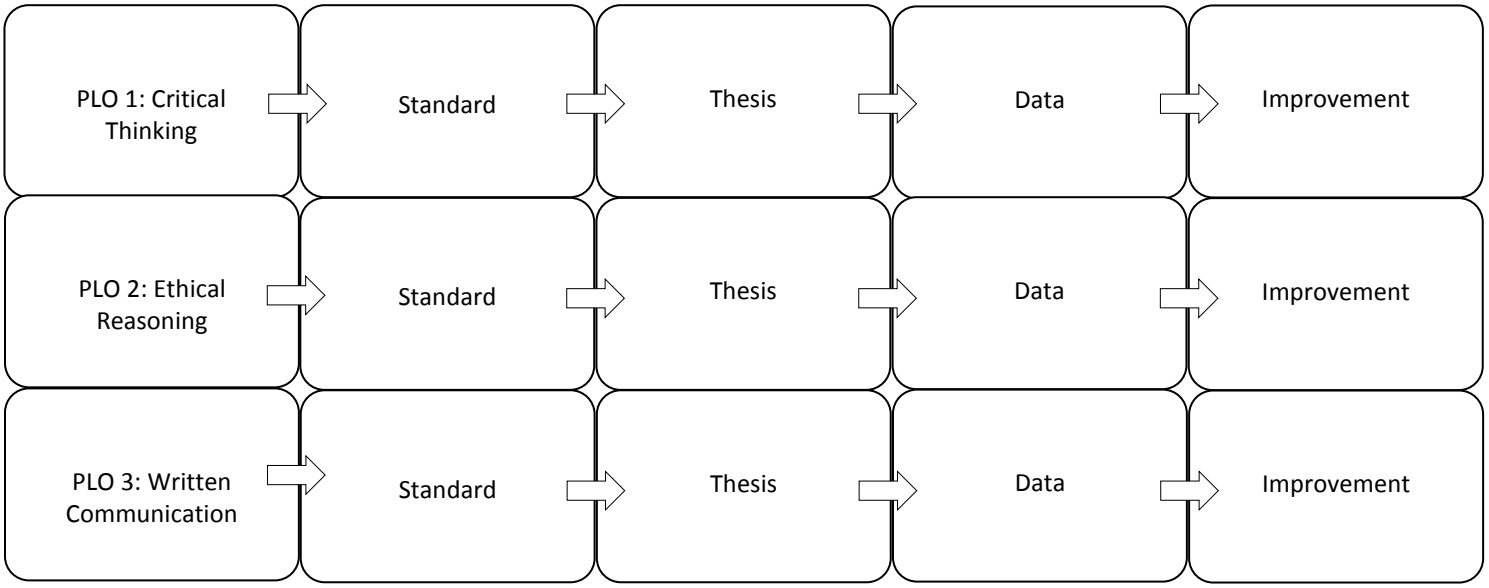


Assessment Flowchart – Multiple PLOs

Multiple PLOs Assessed by One Assignment



Multiple-PLOs Example



Attachment III: Program Learning Outcomes (PLOs) for the Educational Technology (iMet) Graduate Program

Table I: The Results for Critical Thinking Skill

Note: Data shown here drawn from Data Collection Sheet[1]

Different Levels[2] / Five Criteria (Areas)[2]	Capstone (4)	Milestone (3)	Milestone (2)	Benchmark (1)	Total (N=10)
6.1: Explanation of issues	38%	54%	0%	8%	(100%, N=13)
6.2: Evidence	15%	46%	23%	15%	(100%, N=13)
6.3: Influence of context and assumptions	15%	46%	23%	15%	(100%, N=13)
6.4: Student's position	23%	54%	8%	15%	(100%, N=13)
6.5: Conclusions and related outcomes	15%	54%	15%	15%	(100%, N=13)

Standards of Performance for Education Technology (iMet) Graduate Students

Q2.3. If your program has an explicit standard(s) of performance for the selected PLO, describe the desired level of learning: *Seventy percent (70 %) of our students will score 3.0 or above using the VALUE rubric by the time they graduate from the four semester program.*

[1]Critical Thinking Data Collection Sheet

Different Levels[2] / Five Criteria (Areas) [2]	(4)	(3)	(2)	(1)	Total (N=10)
6.1: Explanation of issues	5	7	0	1	(N=13)
6.2: Evidence	2	6	3	2	(N=13)
6.3: Influence of context and assumptions	2	6	3	2	(N=13)
6.4: Student's position	3	7	1	2	(N=13)
6.5: Conclusions and related outcomes	2	7	2	2	(N=13)

[2]Critical Thinking Value Rubric

Criterion	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
6.1: Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
6.2: Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
6.3: Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).
6.4: Student's position (perspective, thesis/ hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position.	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
6.5: Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect students' informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Appendix I: Critical Thinking Value Rubric for PLO 6: Critical Thinking Skill (Rubric to Assess Master Thesis and ePortfolio)

Criterion	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
6.1: Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
6.2: Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
6.3: Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).
6.4: Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position.	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
6.5: Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Standards and Achievement Targets: 70 % of our first year graduate students should score **3 or above** by the time of their graduation.

Appendix II: Key Assessment for the iMET Program
Culminating Experience Report

Culminating Experience Report (Action Research Report): The main task in action research is to design and implement a study using data collection tools that will allow you to "show" the reader what happened during and as a result of your intervention. After collecting your data, you will sort through your findings, looking for bits of data that reveal some information pertinent to your study. You then look for relationships (patterns) between these bits or pieces. The patterns that emerge from a variety of sources such as things that happen, things that you observe, things that people say and things that you measure result in your findings (conclusions).

Suggested Headings for iMET Action Research Report

Title Page
Abstract
Introduction

Statement Of The Problem
Significance
Research Questions
Definitions

Review of Literature
Methods

Description of the Innovation/Intervention
Setting
Limitations/Delimitations of the Study
Data Collection
- **Types of data collected.**
- **Subjects.**
- **Variables.**
- **Steps taken.**

Data Analysis
- **Procedures.**
- **Validity and reliability.**

Findings
Discussion
References
Appendices

Appendix III: Key Assessment for the iMET Program
ePortfolio

The iMET culminating experience is an ePortfolio consisting of:

1. **Abstract**: Simply put, the portfolio abstract is an introduction to your e-portfolio. The basic components of the abstract includes elements such as:
   - a welcome to the reader
   - an overview of the portfolio components
   - an introduction to the navigation of the portfolio
2. **Process**: The process section of the portfolio consists of a personal reflection on your experience of the iMET program and a resume. In addition, many students include a narrative of their teaching history and philosophy in this section.
3. **Products:** In the product section of the portfolio, you link artifacts (products) you have created during your time in the program. Each product you include in the product section must be accompanied by:
   - a description of how the product was conceived (what was the individual or group process that led to the creation of the product).
   - a description of how technology and teaching strategies were utilized
   - standards covered by the use of the product
   - feedback on the product you have received from received 2 peers and 1 faculty on your project
   - Most portfolio's contain at least 3-5 Artifacts
4. **Report: Literature Review and Action Research**

Literature Review: The goal of the literature review is to introduce your readers to your research by synthesizing for them what has been written about your area of focus. It is also a place where you address the educational theories that motivated the design of your research. Ultimately, the review of literature should set the stage for your discussion of your research. Also remember that, though you can use a variety of sources, it is very important to share primary sources of information.

Action Research: The main task in action research is to design and implement a study using data collection tools that will allow you to "show" the reader what happened during and as a result of your intervention. After collecting your data, you will sort through your findings, looking for bits of data that reveal some information pertinent to your study. You then look for relationships (patterns) between these bits or pieces. The patterns that emerge from a variety of sources such as things that happen, things that you observe, things that people say and things that you measure result in your findings (conclusions).

5. **Symposium: Electronic Poster and/or Webinar**