Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to gather relevant information, examine information and form a conclusion based on that information (Critical Thinking).

Outcome Measure:

Annual: Each student will be required to write a paper on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria which will be applied to their paper and will be rated by the faculty using a rubric with a scale of 4 (capstone) to 1 (benchmark) in the following areas:

- Explanation of issues
- Evidence: Selecting and using information to investigate a point of view or conclusion
- Conclusion and related outcomes (implications and consequences)

Annual: ETS Proficiency Profile

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas. This is based on the AAC&U 1-4 point scoring system.

ETS: 85% of the students will be marginal or proficient at Level 2 Reading/Critical Thinking.

Aligned with DQP Learning Areas (circle one or more):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Critical Thinking Rubric	Percentage of Students at 2.5 or Higher			
	2012-13	2013-14	2014-15	2015-16
Explanation of issues	100%	77%	100%	89%
Evidence	100%	77%	89%	84%
Conclusions and related outcomes (implications and consequences)	100%	85%	89%	89%
	Percentage of Students Marginal or Proficient			
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16
ETS Exam	80%	92%	100%	89%

Conclusions Drawn from Data:
The AAC&U rubrics are written in a language that is rooted in the humanities. We have had to work with students to translate/clarify the meaning of some aspects of the rubric, assignment and our expectations. They are generally meeting our expectations. We however still have work to do.

Our students have been meeting the benchmark on the ETS exam. The variability has to do with the small sample size.

Changes to be Made Based on Data:
We are providing the students with the critical thinking rubric as part of the instructions for the assignment and starting in 2014-15 we began having them self-assess their work with the rubric before submission. We expect to need to further modify the rubric to use language that is better understood by our students.

Rubric:

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MICS Critical Thinking Rubric (2/6/13)
Adapted from the AAC&U Value Rubric

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	Capstone – 4	Milestone -3	Milestone - 2	Benchmark -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.
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. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
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.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (Information Literacy).

Outcome Measure: Annual: Each student will be required to write a paper on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance and their paper will be rated by the faculty using a rubric with a scale of 4 (capstone) to 1 (benchmark) in the following areas:

- References: Multiple references from distinct reputable sources
- Citation: References cited in the body of the document
- Synthesis: Appropriately synthesizes information from multiple distinct sources.

Criteria for Success: 80% of the students should have an average score of at least 3 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Information Literacy	Percentage of Students at 2.5 or Higher			
	2012-13	2013-14	2014-15	2015-16*
References				95%
Citation				84%
Synthesis				84%
Determine the Extent of Information Needed	100%	62%	78%	
Access the Needed Information	91%	69%	100%	
Evaluate Information and its Sources Critically (carefully explains the reasons for the choice of source) (added 2014-15)			33%	
Use Information Effectively to Accomplish a Specific Purpose	91%	85%	89%	
Access and Use Information Ethically and Legally	91%	77%	100%	

* Note that in 2015-16 we returned to gathering information literacy data from our writing rubric. The AAC&U rubric was not working well for our purposes.

Conclusions Drawn from Data:
For the first two years we applied the rubric to the student's final senior paper to measure their use of information. The quality of the use of information was uneven and we had not made our expectations clear.

The students are still having trouble articulating the reasons that they have selected a specific reference for use in their final paper. They are also not cite sources with the consistency that we would desire.

Changes to be Made Based on Data:
In 2014-15 we changed the assignment so that seniors submit a literature review in advance of submitting their final senior paper. This has helped students to consider their choice of references. The paper rubric (attached) has IL components and the students are asked to do a self-assessment with the rubric before turning in their final paper.

The first year of the literature review process was disappointing. We redesigned the process and changed the rubric. We returned to using the IL components of our writing rubric for assessment of IL in the senior seminar. This rubric has been in use for 10 years and the students better understand the expectations communicated by the rubric.

In addition, the change in general education requirements means that all students will be required to take an upper division literature course and that should help reinforce some of these skills closer to the time that our students are writing their final paper in senior seminar.

Rubric
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Bibliography and supporting documents	☐ Multiple references from distinct reputable sources	☐ Most references from distinct reputable sources	☐ Some references from reputable sources	☐ No bibliography or all references from untrusted sites on the internet
	☐ References cited in the body of the document	☐ Some citation of references in the body of the document	☐ Limited citation of references in the body of the document	☐ No citation of references in the body of the document
Organization	☐ Conveys a central theme with all ideas connected, arrangement of ideas clearly related to topic	☐ Conveys a central idea or topic with some ideas connected to the topic	☐ Attempts to focus on an idea or topic with many ideas not connected to the topic	☐ Has little or no focus on central idea or topic
	☐ Clear introduction, body (with sections), and conclusion includes summary and closure	☐ Includes introduction, body and conclusion	☐ Introduction, body, conclusion detectable but not clear	☐ Introduction, body or conclusion absent
	☐ Includes both an abstract and table of contents	☐ Includes abstract and table of contents (one partial and one complete)	☐ Includes partial abstract and partial table of contents	☐ No abstract or table of contents
Grammar and spelling	☐ No use of first- person tense	☐ Few uses of the first-person tense	☐ Several uses of the first- person tense	☐ Written in first-person tense
	☐ No grammatical or spelling errors	☐ Few grammatical and spelling errors	☐ Some grammatical and spelling errors	☐ Many grammatical and spelling errors
Depth of information	☐ Appropriately synthesizes information from multiple distinct sources	☐ Synthesis of information from at least three distinct sources	☐ Synthesis of information from at least two distinct sources	☐ Summary reporting of information without synthesis
	☐ Draws conclusions and personal insights from synthesis	☐ At least two personal insights or conclusions stated	☐ At least one personal insight or conclusion stated	☐ No personal insights
	☐ Has the minimum number of pages including penalty pages; subject coverage is excellent	☐ Has the minimum number of pages including penalty pages; subject coverage is good	☐ Has the minimum number of pages including penalty pages; subject coverage is adequate	☐ Does not have the minimum number of pages including penalty pages
Clarity of writing	☐ Sentences flow	☐ Good sentence structure	☐ Occasional poor sentence structure	☐ Frequent poor sentence structure
	☐ Smooth transitions between paragraphs	☐ Adequate transitions between paragraphs	☐ Transitions between paragraphs unclear	☐ Lacked transitions between paragraphs
	☐ Any and all terms and acronyms are defined	☐ Most terms and acronyms are defined	☐ Some terms and acronyms are defined	☐ Many terms and acronyms are undefined
	☐ Provides evidence to support points	☐ Lacks support for some points	☐ Provides minimal support for points	☐ Ideas not supported

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to speak about their work with precision, clarity and organization (Oral Communication).

Outcome Measure: Annual: Each student will be required to give a 20-minute oral presentation on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance of their presentation and will be rated by the faculty using a rubric with a scale of 4 (outstanding) to 1 (unsatisfactory) in the following areas:

- Command of background material
- Organization
- Oral presentation skills (added as part of the new rubric in the spring of 2010)
- Use of presentation tools
- Ability to field questions from the audience

Note that the department has a mapping between its rubric and the AAC&U Oral Communication Value Rubric.

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas in the department rubric. This translates to 80% of the students being above a 3.5 in the AAC&U rubric.

Our translation from our data to the AAC&U is included. Our department continues to provide the students with our departmental rubric because it has been developed over many years and works effectively with our majors.

Aligned with DQP Learning Areas (circle one or more):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Oral Presentation	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Background	92%	80%	94%	94%	88%	100%	95%	100%	100%	92%	100%	95%
Organization	92%	80%	94%	94%	94%	100%	85%	100%	100%	100%	100%	100%
Oral presetnation skills (2010)						100%	90%	100%	100%	92%	100%	95%
Presentation Tools	83%	80%	94%	88%	94%	100%	100%	100%	100%	100%	100%	100%
Ability to field questions	92%	80%	94%	81%	100%	100%	100%	83%	100%	100%	89%	100%

AAC&U "translation" (we have only done this for the years that PLNU has been making use of the DQP)

Oral AAC&U	2012-13	2013-14	2014-15	2015-16
Organization	100%	100%	100%	100%
Language	100%	92%	100%	100%
Delivery	100%	92%	100%	95%
Supporting Material	100%	100%	100%	100%
Central Message	100%	100%	89%	100%

Conclusions Drawn from Data:
In general, the students have been performing reasonably well in the area of giving oral presentations. We attribute this to the fact that we intentionally have students presenting technical material in front of others starting in their freshman year.

Changes to be Made Based on Data:
Over time we have increased our standards and expanded the rubric to increase clarity for students and to push them to speak at a professional level. Looking at the scores, it is possible to see the times when alterations have been made:
- 2008-09 Standards tightened
- 2009-10 Rubric expanded to include more detailed instructions

MICS Oral Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Command of background material	□ Clearly knows material and key facts by memory □ Expands on PPT slides □ Content appropriate for audience	□ Clearly knows key facts with a few memory slips □ Some expansion on PPT slides □ Partial audience adaptation of content	□ Reads some information; knows some facts from memory □ No expansion of PPT slide content □ Little audience adaptation of content	□ Reads sentences from slides □ Dependent on notes □ Lacks audience adaptation of content
Organization	□ Clear and concise outline □ Relevant graphics and key text items on slides □ Presentation length is +/- 30 seconds of time limit	□ Clear outline □ Too much information on slides (not concise) □ +/- 1 minute of time limit	□ Some sense of outline □ Too much detailed information on slides □ +/- 1:30 of time limit	□ No clear outline □ Slides are in paragraphed; too much detailed information on one slide □ +/- 2 minutes of time limit
Oral Presentation skills	□ Clearly has practiced several times; smooth transitions □ Engages audience in content at least twice and engagement is well connected to talk (questions, examples, etc) □ Free of disfluencies (ah, uhm) □ Is clearly heard in the room and uses inflection for emphasis □ Engaged audience through eye contact □ Engaged audience through gestures	□ Has practiced but transitions are not smooth □ Engages audience at least once in content (questions, examples, etc.) and engagement is well connected to the talk. □ A few disfluencies (ah, umh, er) □ Can be understood most of the time and uses some inflection □ Some engagement of audience through eye contact □ Some engagement of audience through gestures	□ Has practiced presentation but cannot verbally make transitions between slides □ Audience engagement at least once with content (questions, examples, etc.) but it is not well connected to the talk. □ Many disfluencies (ah, umh, er) □ Can sometimes be understood and uses little inflection □ Infrequent eye contact □ Distracting gestures or mannerisms	□ Clearly did not practice presentation; Does not anticipate content of next slide □ No audience involvement □ Disfluencies (ah, umh, er) detract from presentation □ Can not be heard and/or speaks in a monotone □ Little audience awareness or eye contact □ Frequent distracting gestures or mannerisms
Use of Presentation Tools	□ PPT background is matched to content, legible font, seamless transitions □ Graphics imbedded and matched to topic, necessary hyperlinks work	□ Appropriate PPT slide backgrounds, transitions & font □ Most graphics imbedded and matched to topic, most necessary hyperlinks work	□ Distracting PPT slide backgrounds and transitions, font hard to read □ Some inappropriate graphics or use of PPT embellishments, necessary hyperlinks don't work	□ No attention given to PPT slide backgrounds and transitions, font illegible □ Distracting use of embellishments, graphics not connected to topic
Ability to field questions	□ Able to answer questions clearly and without hesitation and prepared material to answer anticipated questions	□ Can answer all questions with some hesitation	□ Able to answer half of the questions with hesitation	□ Unable to answer any questions

Translation between MICS and AAC&U Rubric

MICS Category	MICS Item Position in Rubric	AAC&U Category
Clear and concise outline	4	Organization
Relevant graphics and key text items on slides	5	Organization
Presentation length is +/- 30 seconds of time limit	6	Organization
Expands on PPT slides	2	Language
Content appropriate for audience	3	Language
Engages audience	8	Language
Transitions	7	Delivery
Free of disfluencies (ah, uhm)	9	Delivery
Is clearly heard in the room and uses inflection for emphasis	10	Delivery
Engaged audience through eye contact	11	Delivery
Engaged audience through gestures	12	Delivery
PPT background is matched to content, legible font, seamless transitions	13	Delivery
Relevant graphics and key text items on slides	5	Supporting
Graphics imbedded and matched to topic, necessary hyperlinks work	14	Supporting
Clearly knows material and key facts by memory	1	Central Message
Able to answer questions clearly and without hesitation	15	Central Message

AAC&U Value Rubric

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats (Quantitative Reasoning).

Outcome Measure: Annual: Each student will participate in the ETS Proficiency Profile exam.

Criteria for Success: 95% of the students will be Marginal or Proficient at Level 2.

Aligned with DQP Learning Areas (circle one or more):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percent 2.5 or Higher	
MICS Rubric	2014-15	2015-16
Students will be able to formulate a mathematical model from a verbal description of a problem.	44%	94%
Students will be able it solve non-routine problems using logic and quantitative techniques.	100%	94%
Students will be able to construct solutions to problems using computational techniques.	89%	82%

	Percentage at Marginal or Proficient			
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16
ETS Percentage - Level 2	100%	100%	100%	100%

Conclusions Drawn from Data:
When scoring the activity problems in 2014-15, we realized that some of the students had mis-interpreted the question related to "formulate a mathematical model from a verbal description." This made the problem difficult to score. The assignment was revised in 2015-16. The university is using the ETS test to measure core competencies and that data is presented here as well. The students have done well in meeting benchmarks with both measures.

Changes to be Made Based on Data:
Revise the QL class activity. This was done and the students were more successful in 2015-16. Because of the nature of the disciplines in our department, our curriculum focuses a great deal on quantitative skills. We have found that a single rubric can not be created in a way that allows for the breadth of quantitative thinking and skills that we see in our senior projects and creating a class activity has seemed artificial. So we will be using the ETS exam as a measure of the core competency going forward.

Rubrics
Activity Rubric (attached)
ETS Proficiency Profile (no rubric involved)

Quantitative Reasoning Rubric (this is the same rubric we use for general education)

	Unsatisfactory	Low Satisfactory	Satisfactory	High Satisfactory	Outstanding
Students will be able to formulate a mathematical model from a verbal description of a problem (#1 up to filling in formula).	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able it solve non-routine problems using logic and quantitative techniques (#2).	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able to construct solutions to problems using computational techniques (#1 computation of payment).	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct

Translation between AAC&U Value Rubric and MICS Quantitative Literacy Rubric

Note that the main reason that our department has chosen to not use the AAC&U rubric is that the underlying assumption of the rubric is that students are working with statistical information and are writing text about that statistical information. There is a great deal more to quantitative literacy than statistics and writing about data.

MICS Category	AAC&U Category
	Interpretation *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)*
Students will be able to formulate a mathematical model from a verbal description of a problem	**Representation** *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)*
Students will be able to construct solutions to problems using computational techniques	**Calculation**
	Application / Analysis *Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis*
	Assumptions *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis*
	Communication *Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)*
Students will be able it solve non-routine problems using logic and quantitative techniques	

AAC&U Value Rubric

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Interpretation *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.*	Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explains the trend data shown in a graph.*	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.*	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. *For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.*
Representation *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.
Calculation	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive.
Application / Analysis *Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis*	Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work.	Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work.
Assumptions *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis*	Explicitly describes assumptions and provides compelling rationale for why each assumption is appropriate. Shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions.	Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate.	Explicitly describes assumptions.	Attempts to describe assumptions.
Communication *Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)*	Uses quantitative information in connection with the argument or purpose of the work, presents it in an effective format, and explicates it with consistently high quality.	Uses quantitative information in connection with the argument or purpose of the work, though data may be presented in a less than completely effective format or some parts of the explication may be uneven.	Uses quantitative information, but does not effectively connect it to the argument or purpose of the work.	Presents an argument for which quantitative evidence is pertinent, but does not provide adequate explicit numerical support. (May use quasi-quantitative words such as "many," "few," "increasing," "small," and the like in place of actual quantities.)

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to write about their work with precision, clarity and organization (Written Communication).

Outcome Measure:
Annual: Each student will be required to write a paper on a topic in their field as a part of their participation in the Senior Seminar. The audience for this talk will include department faculty, fellow students and possibly some alumni. The students will be given the evaluation criteria in advance of their presentation and will be rated by the faculty using a rubric with a scale of 4 (outstanding) to 1 (unsatisfactory) in the following areas:

- Bibliography and other supporting documentation
- Organization
- Grammar and spelling
- Depth of information
- Clarity of writing

Note that the department has a mapping between its rubric and the AAC&U Written Communication Value Rubric.

Annual: ETS Proficiency Profile.

Criteria for Success: 80% of the students should have an average score of at least 2.5 in each of the major areas in the department rubric. This translates to 80% of the students being above a 3.5 in the AAC&U rubric.

ETS: 85% of our students will be marginal or proficient on the Level 2 Writing test.

Our translation from our data to the AAC&U is included. Our department continues to provide the students with our departmental rubric because it has been developed over many years and works effectively with our majors

Aligned with DQP Learning Areas (circle one or more):
1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

Written Report	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Bibliography and support	82%	60%	88%	69%	75%	88%	55%	93%	100%	100%	100%	89%
Organization	91%	87%	94%	100%	88%	63%	65%	93%	100%	100%	100%	100%
Grammar and Spelling	91%	73%	88%	94%	75%	81%	60%	79%	100%	92%	89%	84%
Depth of Information	82%	60%	88%	81%	88%	88%	50%	93%	91%	77%	78%	89%
Clarity of Writing	82%	80%	94%	94%	69%	81%	70%	79%	91%	77%	78%	89%

AAC&U "translation" (we have only done this for the years that PLNU has been making use of the DQP)

Written AAC&U	2012-13	2013-14	2014-15	2015-16
Organization	100%	100%	100%	89%
Language	100%	92%	100%	89%
Delivery	100%	92%	100%	100%
Supporting Material	100%	100%	100%	89%
Central Message	100%	100%	89%	84%

	Percentage at Marginal or Proficient			
Written ETS	2012-13	2013-14	2014-15	2015-16
ETS Proficiency Profile	60%	85%	100%	89%

Conclusions Drawn from Data:
In general, the students have been performing reasonably well in writing technical reports. We still some weaknesses in the quality of their writing and the use of their source material. The sample size for ETS in the first year was extremely small so we are not particularly concerned about the fact that the score was below the benchmark.

Changes to be Made Based on Data:
Over time we have increased our standards and expanded the rubric to increase clarity for students and to push them to speak at a professional level. Looking at the scores, it is possible to see the times when alterations have been made:
- 2008-09 Standards tightened
- 2009-10 Rubric expanded to include more detailed instructions
- In 2014-15 we instituted a literature review assignment to strengthen the students' capacity for using resources and identifying why the resources are relevant. This assignment needs to be adjusted, but seems to have helped students to understand their work.

In addition, the university has just changed general education requirements so that students will take an upper division literature class. We hope that this further exposure to formal writing later in their academic career will help to strengthen our students' writing.

MICS Written Presentation Rubric

Criteria	Outstanding	High Satisfactory	Low Satisfactory	Unsatisfactory
Bibliography and supporting documents	☐ Multiple references from distinct reputable sources	☐ Most references from distinct reputable sources	☐ Some references from reputable sources	☐ No bibliography or all references from untrusted sites on the internet
	☐ References cited in the body of the document	☐ Some citation of references in the body of the document	☐ Limited citation of references in the body of the document	☐ No citation of references in the body of the document
Organization	☐ Conveys a central theme with all ideas connected, arrangement of ideas clearly related to topic	☐ Conveys a central idea or topic with some ideas connected to the topic	☐ Attempts to focus on an idea or topic with many ideas not connected to the topic	☐ Has little or no focus on central idea or topic
	☐ Clear introduction, body (with sections), and conclusion includes summary and closure	☐ Includes introduction, body and conclusion	☐ Introduction, body, conclusion detectable but not clear	☐ Introduction, body or conclusion absent
	☐ Includes both an abstract and table of contents	☐ Includes abstract and table of contents (one partial and one complete)	☐ Includes partial abstract and partial table of contents	☐ No abstract or table of contents
Grammar and spelling	☐ No use of first- person tense	☐ Few uses of the first-person tense	☐ Several uses of the first- person tense	☐ Written in first-person tense
	☐ No grammatical or spelling errors	☐ Few grammatical and spelling errors	☐ Some grammatical and spelling errors	☐ Many grammatical and spelling errors
Depth of information	☐ Appropriately synthesizes information from multiple distinct sources	☐ Synthesis of information from at least three distinct sources	☐ Synthesis of information from at least two distinct sources	☐ Summary reporting of information without synthesis
	☐ Draws conclusions and personal insights from synthesis	☐ At least two personal insights or conclusions stated	☐ At least one personal insight or conclusion stated	☐ No personal insights
	☐ Has the minimum number of pages including penalty pages; subject coverage is excellent	☐ Has the minimum number of pages including penalty pages; subject coverage is good	☐ Has the minimum number of pages including penalty pages; subject coverage is adequate	☐ Does not have the minimum number of pages including penalty pages
Clarity of writing	☐ Sentences flow	☐ Good sentence structure	☐ Occasional poor sentence structure	☐ Frequent poor sentence structure
	☐ Smooth transitions between paragraphs	☐ Adequate transitions between paragraphs	☐ Transitions between paragraphs unclear	☐ Lacked transitions between paragraphs
	☐ Any and all terms and acronyms are defined	☐ Most terms and acronyms are defined	☐ Some terms and acronyms are defined	☐ Many terms and acronyms are undefined
	☐ Provides evidence to support points	☐ Lacks support for some points	☐ Provides minimal support for points	☐ Ideas not supported

Translation between MICS and AAC&U Rubric

MICS Category	MICS Item Position in Rubric	AAC&U Category
Conveys a central theme with all ideas connected, arrangement of ideas clearly related to topic	3	Purpose
Appropriately synthesizes information from multiple distinct sources	8	Development
Draws conclusions and personal insights from synthesis	9	Development
Has the minimum number of pages including penalty pages; subject coverage is excellent	10	Development
Provides evidence to support points	14	Development
Clear introduction, body (with sections), and conclusion includes summary and closure	4	Genre
Includes both an abstract and table of contents	5	Genre
Multiple references from distinct reputable sources	1	Source
References cited in the body of the document	2	Source
No use of first- person tense	6	Syntax
No grammatical or spelling errors	7	Syntax
Sentences flow	11	Syntax
Smooth transitions between paragraphs	12	Syntax
Any and all terms and acronyms are defined	13	Syntax

AAC&U Written Communication Value Rubric

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Context of and Purpose for Writing *Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).*	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Genre and Disciplinary Conventions *Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).*	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.