

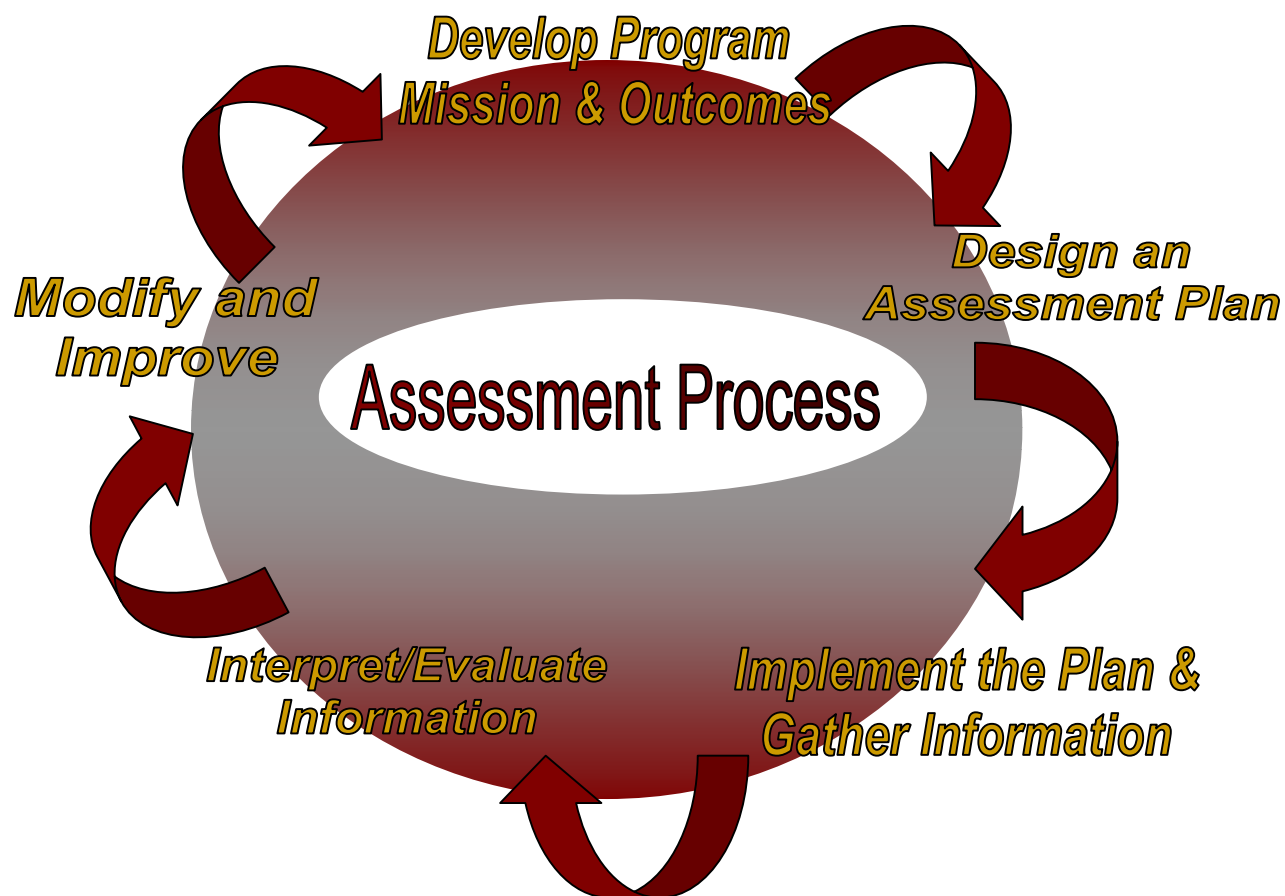


# Inquiry-Guided Learning: Ideas for Assessing

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*Adapted from Trudy Banta, IUPUI*



## Outcomes: Successful students should be able to...

<b>Competencies in Inquiry</b>	<b>Specific Options</b>
Formulate good questions and/or identify problem(s) within the discipline	Identify real-world discipline specific research project topics
Examine, identify, and gather information regarding the question(s) and/or problem(s)	Conduct quality primary and secondary research to attempt to answer research questions
Formulate conclusion(s) and/or select the best solution with appropriate justification	Base conclusions on solid, credible research and analysis; define limitations  and suggest further research
Analyze, interpret, and present results	Prepare findings in different formats (written, web, and oral)
Evaluate the worth and importance of those conclusion(s) – including their placement in a social, environmental, and historical context, as appropriate	Discuss findings in relation to constituents



## Assessment Methods: Measures of Learning

### ➤ Direct

- Raters Apply Checklists/Rubrics to student work, such as Capstone projects, student portfolios, lab work, and research papers (can use samples of student work)
- Locally developed embedded assessments

### ➤ Indirect

- NSSE and other Surveys (See Reinvention Center Web site)  
<http://www.reinventioncenter.miami.edu/ResAssessment.htm>
- Interviews (individual or group)
- Participation rates

*For more information on direct and indirect assessment methods, see*  
<http://assessment.tamu.edu/asmt/methods.htm>.



## Four Developmental Stages of Inquiry

### ➤ Stage 1

- Observes and records most evident aspects of issue/object/work
- Identifies and defines the explicit elements of issue/object/work
- Articulates the observations
- Develops accuracy of observations through practice, assessment, feedback, and self-assessment
- Uses oral and written exercises and discussions to increase observational skills and the use of terminology
- Gathers information from few sources



### Stage 2

- Continues to refine observational skills by practicing using feedback from assessments
- Identifies assumptions and implicit implications of issue/object/work
- Learns to make inferences based on observations
- Articulates the methods by which inferences were made from observations
- Uses feedback on the quality of the inferences as well as on one's thought process in order to improve self-assessment
- Uses experiences of what is being studied to develop own understanding.
- Recognizes concepts once they have been applied.
- Recognizes when one's own experiences may be an example of concept.
- Gathers information from a few, critical sources

*Adapted from Bowling Green State University*



## Four Developmental Stages of Inquiry

### ➤ Stage 3

- Explores the relationships both between and among the inferences and observations
- Articulates the process used to make and examine these relationships
- Learns from modeling and examples of observations/inferences/relationships
- Applies concepts to experiences
- Explores issue/object/work from others' perspectives
- Seeks a thorough understanding of issue/object/work prior to making judgments about issue/object/work
- Gathers information from multiple sources

### ➤ Stage 4

- Integrates observations/inferences/relationships of issue/object/work
- Assesses the significance of the relationships to the overall meaning of the work
- Articulates the importance of the observations/inferences/relationships to the overall unity and meaning of the work
- Explores issue/object/work from multiple perspectives
- Makes judgments only after thoroughly exploring issue/object/work
- Explores issue/object/work using methods from multiple disciplines
- Examines relationships between issues/objects/works
- Gathers information from multiple sources and evaluates their credibility

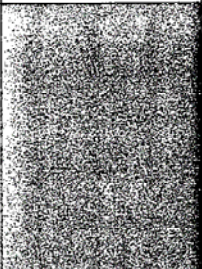
*Adapted from Bowling Green State University*



# Current Understanding of Inquiry-guided Learning

Virginia Lee [http://qep.tamu.edu/documents/VaLee\\_ncsu.pdf](http://qep.tamu.edu/documents/VaLee_ncsu.pdf)

Table 1.1 Current Understanding of Inquiry-guided Learning

<i>Stages of inquiry</i>	<i>Critical thinking</i>	<i>Kolb's learning cycle</i>	<i>Teaching strategies</i>	<i>Continuum of support</i>	<i>Selected methods of assessment</i>
Content	Knowledge Comprehension		Various (see below)	✓ Various (see below)	Quizzes, exams Outlines Concept maps Briefing (paper) (Mini-) Papers, reports Oral presentations (Annotated) Bibliography
Develop question Design/frame experiment/ study Select raw data [Define/represent problem] ↓	Synthesis	Active Experimentation ↓	Laboratories Direct observation Primary text reading Simulations/games Field work Problems Case studies Service learning Problem-based learning Project (e.g., design) Performance Internships	<ul style="list-style-type: none"> <li>✓ Question/problem provided</li> <li>✓ Readings selected</li> <li>✓ Parameters provided</li> <li>✓ Site selected</li> <li>✓ Guiding questions provided</li> <li>✓ Prompts provided</li> <li>✓ Heuristic provided</li> <li>✓ Modeling</li> <li>✓ Coaching</li> </ul>	Research proposal Study design/plan Problem statement Develop question/ hypothesis Chart, diagram, flowchart

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# Current Understanding of Inquiry-guided Learning

Virginia Lee [http://qep.tamu.edu/documents/VaLee\\_ncsu.pdf](http://qep.tamu.edu/documents/VaLee_ncsu.pdf)

Observe Record [Explore, generate strategies] ↓		Concrete Experience ↓	See above [Role play]	<ul style="list-style-type: none"> <li>✓ Questions provided</li> <li>✓ Worksheet provided</li> <li>✓ Guidelines provided</li> </ul>	Log Lab/field notes Observation lists Idea lists Tables, charts Alternative drafts/solutions
Organize Analyze [Analyze alternative strategies] ↓	Analysis	Reflective Observation ↓	Logs/journals Other writing assignments Discussion Brainstorming [Debate/panel]	<ul style="list-style-type: none"> <li>✓ Questions provided</li> <li>✓ Format provided</li> <li>✓ Articulation</li> </ul>	Charts, tables, diagrams, flowcharts (Mini-) Papers Memo Taxonomy/set of categories Journal
Interpret Evaluate [Select strategy] ↓	Synthesis Evaluation	Abstract Conceptualization ↓	Lecture Readings Films/videotapes Concept maps Demonstrations	<ul style="list-style-type: none"> <li>✓ Outlines</li> <li>✓ Note-taking guidelines</li> <li>✓ Concept maps</li> <li>✓ Guiding questions</li> </ul>	Briefing paper Abstract (Mini-) Paper Statement of assumptions Performance (e.g., clinical, artistic) Reflective journal Case analysis Diagnosis Regulation, law, rule Plan (e.g., nursing, construction)

Developed by Virginia S. Lee, Ph.D., Faculty Center for Teaching & Learning, NC State University.



## Example: Holistic Critical Thinking Scoring Rubric

4	Consistently does all or almost all of the following: Accurately interprets evidence, statements, graphics, questions, etc.; Identifies the salient arguments (reasons and claims) pro and con; Thoughtfully analyzes and evaluates major alternative points of view; Draws warranted, judicious, non-fallacious conclusions; Justifies key results and procedures, explains assumptions and reasons; Fair-mindedly follows where evidence and reasons lead.
3	Does most or many of the following: Accurately interprets evidence, statements, graphics, questions, etc.; Identifies relevant arguments (reasons and claims) pro and con; Offers analyses and evaluations of obvious alternative points of view; Draws warranted, non-fallacious conclusions; Justifies some results or procedures, explains reasons; Fair-mindedly follows where evidence and reasons lead.
2	Does most or many of the following: Misinterprets evidence, statements, graphics, questions, etc.; Fails to identify strong, relevant counter-arguments; Ignores or superficially evaluates obvious alternative points of view; Draws unwarranted or fallacious conclusions; Justifies few results or procedures, seldom explains reasons; Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions.
1	Consistently does all or almost all of the following: Offers biased interpretations of evidence, statements, graphics, questions, information, or the points of view of others; Fails to identify or hastily dismisses strong, relevant counter-arguments.; Ignores or superficially evaluates obvious alternative points of view.; Argues using fallacious or irrelevant reasons, and unwarranted claims; Does not justify results or procedures, nor explain reasons; Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions; Exhibits close-mindedness or hostility to reason.



## Rubric Framework

<b>Outcome</b>	<b>Not developed</b>	<b>Developing</b>	<b>Developed</b>
Formulate good questions and/or identify problem(s) within the discipline			
Examine, identify, and gather information regarding the question(s) and/or problem(s)			
Formulate conclusion(s) and/or select the best solution with appropriate justification			
Analyze, interpret, and present results			
Evaluate the worth and importance of those conclusion(s) – including their placement in a social, environmental, and historical context, as appropriate.			



## Other Rubric Resources

- Reinvention Center <http://www.reinventioncenter.miami.edu/index.html>
- Data for program assessment (ABET) <http://www.engr.ncsu.edu/abet/criterion-3/data-3.html>
- Program outcomes template <http://www.engr.ncsu.edu/abet/criterion-3/template-3.html>
- Assessment techniques  
[http://www.csufresno.edu/ir/documents/assessment\\_techniques\\_3\\_2006.pdf](http://www.csufresno.edu/ir/documents/assessment_techniques_3_2006.pdf)
- Developmental Stages of Inquiry <http://www.bgsu.edu/offices/assessment/Inquiry.htm>
- Inquiry rubric <http://www.galileo.org/research/publications/rubric.pdf>
- Portfolio rubric <http://www.winona.edu/air/resourcelinks/OSU%20portfolio%20rubric.pdf>
- Engineering rubrics <http://www.mines.edu/Academic/petroleum/Assesment/rubrics.htm>
- Research project rubric <http://mciu.org/~spjvweb/resrub.html>
- Problem solving rubric <http://www.winona.edu/air/resourcelinks/analytical%20rubric.htm>
- Quantitative reasoning rubric <http://www.winona.edu/air/documents/quantitativereasoning.pdf>
- Critical reasoning rubric [http://faculty.mckendree.edu/on-lineassessment/critical\\_reasoning\\_competency.htm](http://faculty.mckendree.edu/on-lineassessment/critical_reasoning_competency.htm)
- Critical thinking rubrics
  - [http://www.csufresno.edu/ir/documents/CT\\_rubric\\_1\\_12006.doc](http://www.csufresno.edu/ir/documents/CT_rubric_1_12006.doc)
  - [http://www.csufresno.edu/ir/documents/Critical\\_Think\\_Rubric\\_0606\\_02.doc](http://www.csufresno.edu/ir/documents/Critical_Think_Rubric_0606_02.doc)
  - <http://wsuctproject.wsu.edu/ctr.htm>
- Virginia Lee Rubric [http://qep.tamu.edu/documents/VaLee\\_ncsu.pdf](http://qep.tamu.edu/documents/VaLee_ncsu.pdf)
- Facione Rubric [http://www.insightassessment.com/pdf\\_files/rubric.pdf](http://www.insightassessment.com/pdf_files/rubric.pdf)