

## ASSESSING PROBLEM SOLVING ABILITY

Problem-solving ability is assessed using the *Final Challenge Report* (below), which provides a summary the problem-solving process engaged in by students, a synthesis of the knowledge, skills and strategies employed in solving the challenge, and the reflective judgment used in the students' post-challenge assessment of their solution. We recommend that the Final Challenge Report be assigned after completion of the students' solution presentation, but before the concept mapping exercise.



A rubric for scoring the whiteboards and Challenge solution follows the Final Challenge Report form.

## Final Challenge Report

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Team Members: \_\_\_\_\_

The purpose of the Final Challenge Report is to help you summarize the process you and your team used to solve the PBL Challenge. Please be specific in describing the process. Reflecting on your experience is a powerful way to help you develop the problem-solving and critical thinking skills needed to become a good life-long learner. Make sure you answer each question fully in paragraph form and use a spell-checker.

Using your completed *Whiteboards* as a guide, respond to the following:

- 1) **Problem Analysis:** Clearly describe the problem you had to solve. What specific criteria did your solution have to address? What did you know about the problem? What did you need to learn? Were there any special constraints that applied? What (if any) assumptions did you have to make to solve the problem? Explain.
- 2) **Independent Research:** What specifically did you need to learn? How did you break up the learning tasks among the members of your team? How did you budget your time? What was your strategy for acquiring the knowledge and skills needed to solve the problem? What resources did you use (e.g., Internet, textbooks, journals, etc.)? Was your learning strategy effective? Why or why not? Could you improve your learning strategy in the future? Explain.
- 3) **Brainstorming:** What ideas did you and your group come up for solving the problem? How did you decide on the best possible solution? How did your group function as a team? Did each member of the group effectively contribute to the solution? Explain.
- 4) **Testing Your Idea:** Describe your solution in detail and explain how it addresses each of the criteria identified in the *Problem Analysis* phase. Describe your plan for testing/validating your solution. What resources would you need to test your solution? Are there any limitations? Explain.
- 5) **Solution Quality:** How did your solution compare to the solution presented in the PBL Challenge? Was your solution effective? What (if anything) would you have done differently to improve your solution? Overall, what did you learn from this PBL Challenge?

## Photon PBL Problem Solving Rubric- Page 1 Challenge Title \_\_\_\_\_

Student Name(s) \_\_\_\_\_

Problem-Solving Task	Excellent = 4	Good = 3	Fair = 2	Poor = 1	Score
<b>Problem Analysis</b>	<ul style="list-style-type: none"> <li>• Student clearly and precisely defines problem parameters and criteria for success</li> <li>• Student correctly identifies all relevant knowledge and skills needed to solve problem</li> <li>• Student accurately identifies all relevant problem constraints</li> <li>• Student generates one or more creative and viable solution possibilities</li> </ul>	<ul style="list-style-type: none"> <li>• Student adequately defines problem parameters and criteria for success</li> <li>• Student correctly identifies most relevant knowledge and skills needed to solve problem</li> <li>• Student accurately identifies most relevant problem constraints</li> <li>• Student generates one or more potentially viable solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Student defines some problem parameters and criteria for success</li> <li>• Student correctly identifies some relevant knowledge and skills needed to solve problem</li> <li>• Student identifies some relevant problem constraints</li> <li>• Student generates one or more questionable solution possibilities</li> </ul>	<ul style="list-style-type: none"> <li>• Student incorrectly defines problem parameters and criteria for success</li> <li>• Student incorrectly identifies relevant knowledge and skills needed to solve problem</li> <li>• Student incorrectly identifies problem constraints</li> <li>• Student generates solution possibilities that are either unrealistic or incorrect</li> </ul>	
<b>Self-Directed Learning</b>	<ul style="list-style-type: none"> <li>• Student correctly articulates specific and appropriate learning objectives</li> <li>• Student correctly identifies all required instructional resources</li> <li>• Student has a clear and realistic plan for learning</li> <li>• Student has a clear and realistic plan for monitoring his/her comprehension</li> </ul>	<ul style="list-style-type: none"> <li>• Student correctly articulates specific learning objectives</li> <li>• Student correctly identifies most required instructional resources</li> <li>• Student has an adequate plan for learning</li> <li>• Student has an adequate plan for monitoring his/her comprehension</li> </ul>	<ul style="list-style-type: none"> <li>• Student articulates questionable learning objectives</li> <li>• Student correctly identifies some required instructional resources</li> <li>• Student has a rudimentary plan for learning that needs to be more fully developed</li> <li>• Student has a rudimentary plan for monitoring his/her comprehension that needs to be more fully developed</li> </ul>	<ul style="list-style-type: none"> <li>• Student articulates learning objectives that are irrelevant and/or incorrect</li> <li>• Student identifies instructional resources that are irrelevant and/or incorrect</li> <li>• Student has inadequate or no plan for learning</li> <li>• Student has inadequate or no plan for monitoring comprehension</li> </ul>	
<b>Brainstorming</b>	<ul style="list-style-type: none"> <li>• Student generates numerous viable alternative solutions</li> <li>• Student demonstrate effective collaboration and teamwork skills</li> <li>• Student accurately and correctly identify valid pros and cons</li> <li>• Students precisely and methodically evaluate and rank alternative solutions</li> <li>• Students articulate a clear and concise plan of action for enacting their solution</li> </ul>	<ul style="list-style-type: none"> <li>• Student generate numerous alternative solutions</li> <li>• Student demonstrates adequate collaboration and teamwork skills</li> <li>• Student identifies some valid pros and cons</li> <li>• Students adequately evaluate and rank alternative solutions</li> <li>• Students articulate an adequate plan of action for enacting their solution</li> </ul>	<ul style="list-style-type: none"> <li>• Student generate some alternative solutions that need to be more thoroughly developed</li> <li>• Student demonstrates collaboration and teamwork skills that need refinement</li> <li>• Student identifies some pros and cons but needs to improve process</li> <li>• Students evaluate and rank alternative solutions but methods need improvement</li> <li>• Students articulate a plan of action for enacting their solution that needs refinement</li> </ul>	<ul style="list-style-type: none"> <li>• Student generates inadequate or no alternative solutions</li> <li>• Student demonstrates poor collaboration and teamwork skills</li> <li>• Student either do not identify some pros and cons or do so incorrectly</li> <li>• Students do not evaluate and rank alternative solutions</li> <li>• Students articulate no plan of action for enacting their solution</li> </ul>	

## Photon PBL Problem Solving Rubric – Page 2

Problem-Solving Task	Excellent = 4	Good = 3	Fair = 2	Poor = 1	Score
<b>Test Solutions</b>	<ul style="list-style-type: none"> <li>• Test plan clearly and correctly addresses all solution criteria</li> <li>• Test plan has a well defined and realistic timeline</li> <li>• Testing methods and procedures are appropriate and valid</li> <li>• All testing resources are clearly identified and appropriate</li> <li>• Solution benchmarks are clearly identified and measurable</li> </ul>	<ul style="list-style-type: none"> <li>• Test plan clearly and correctly addresses most solution criteria</li> <li>• Test plan has an adequate and realistic timeline</li> <li>• Testing methods and procedures are appropriate and valid</li> <li>• Most testing resources are identified and appropriate</li> <li>• Solution benchmarks are identified and mostly measurable</li> </ul>	<ul style="list-style-type: none"> <li>• Test plan addresses some solution criteria</li> <li>• Test plan has a timeline that needs refinement</li> <li>• Testing methods and procedures are provided but need improvement</li> <li>• Testing resources need to be more clearly identified</li> <li>• Solution benchmarks are identified but need refinement</li> </ul>	<ul style="list-style-type: none"> <li>• Test plan does not address solution criteria</li> <li>• Test plan does not have timeline</li> <li>• Testing methods and procedures are either not provided or are incorrect</li> <li>• Testing resources are not identified</li> <li>• Solution benchmarks are not identified</li> </ul>	
<b>Solution Quality</b>	<ul style="list-style-type: none"> <li>• Solution clearly and effectively addresses all stated criteria and exceeds performance benchmarks</li> <li>• Solution represents a realistic and cost effective means of addressing problem</li> <li>• Solution is novel, creative and reflects exemplary problem solving and critical thinking skills</li> <li>• Solution can be easily replicated</li> </ul>	<ul style="list-style-type: none"> <li>• Solution effectively addresses most stated criteria and meets most performance benchmarks</li> <li>• Solution represents a realistic means of addressing problem</li> <li>• Solution shows creativity and reflects good problem solving and critical thinking skills</li> <li>• Solution can be easily replicated with some effort</li> </ul>	<ul style="list-style-type: none"> <li>• Solution addresses some stated criteria and meets some performance benchmarks</li> <li>• Solution represents a means of addressing the problem but needs improvement</li> <li>• Solution is shows marginal problem-solving and critical thinking skills</li> <li>• Solution can be replicated but with considerable effort</li> </ul>	<ul style="list-style-type: none"> <li>• Solution does not address stated criteria and/or does not meet performance benchmarks</li> <li>• Solution represents an invalid or ineffective means of addressing the problem</li> <li>• Solution is shows poor problem solving and critical thinking skills</li> <li>• Solution cannot be replicated without major revisions</li> </ul>	
<b>Comments:</b>					<b>Total Score</b>