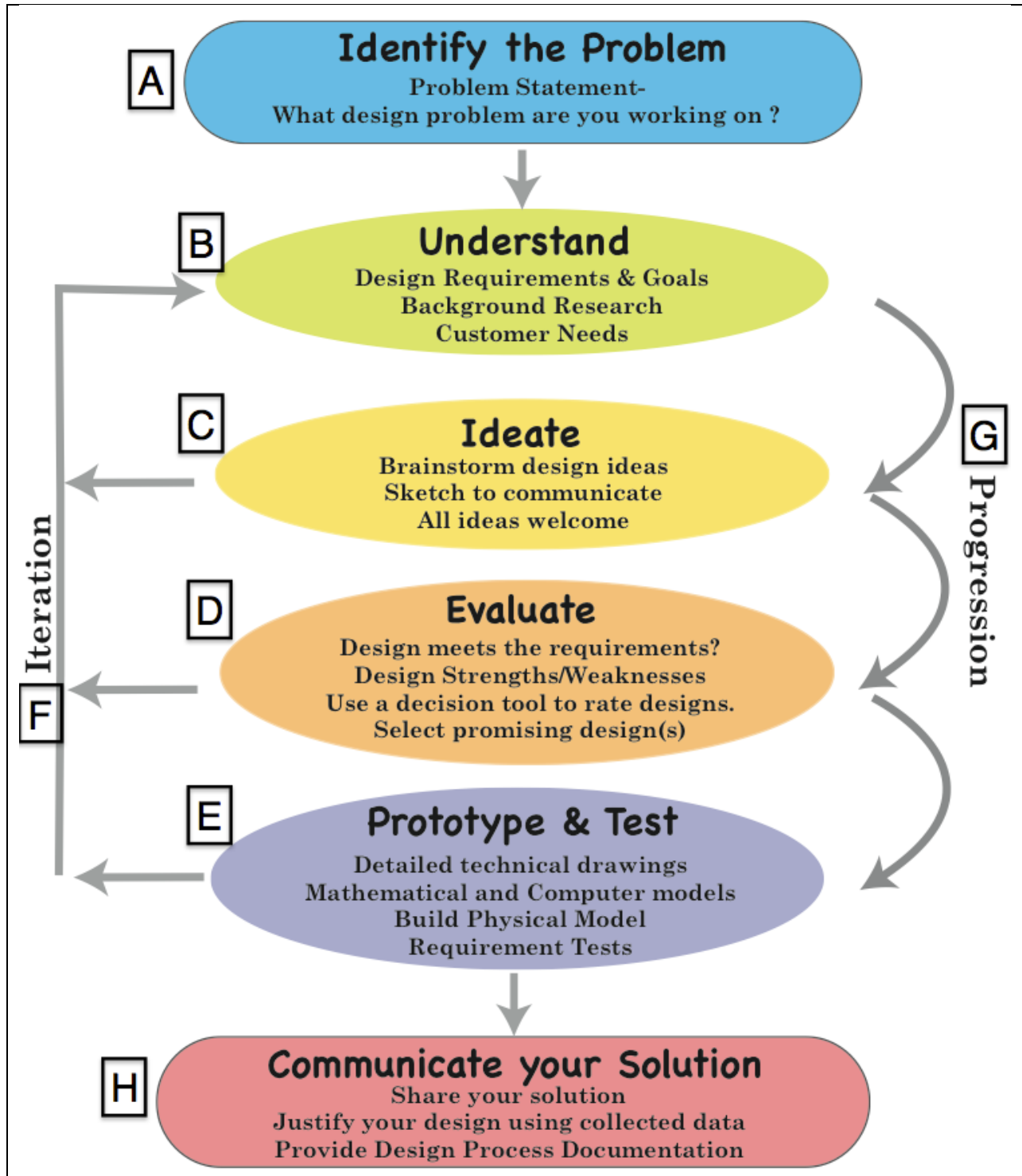


**Engineering Design Process Portfolio Scoring Rubric:  
Adapted for AMP High School Portfolios**



**Element A: Identify the Problem**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	The problem is <b>clearly and objectively</b> identified and defined with <b>considerable depth</b> , and it is <b>well elaborated with specific detail</b> . The problem statement should indicate a clear need and an intended client or market. The problem statement should not propose a particular design solution.
4	<i>Advanced</i>	The problem is <b>clearly and objectively identified</b> and defined with <b>some depth</b> , and it is <b>generally elaborated with specific detail</b> . The problem statement should indicate a clear need, but the market identified may be imprecise. The problem statement should be solution agnostic.
3	<i>Proficient</i>	The problem is <b>somewhat clearly and objectively</b> identified and defined with <b>adequate depth</b> , and it is <b>sometimes elaborated with specific detail</b> , although some information intended as elaboration may be imprecise or general. The problem statement may lack either a clear need or a clear market or client. The problem statement may imply a certain solution or class of solutions.
2	<i>Developing</i>	The problem is identified <b>only somewhat clearly and/or objectively</b> and defined in a <b>manner that is somewhat superficial and/or minimally elaborated</b> with specific detail. The problem statement may be a paraphrase of a given problem statement, but does not indicate further analysis of the need or intended market. The problem statement may favor a particular solution.
1	<i>Novice</i>	The identification and/or definition of the problem is <b>unclear, is unelaborated, and/or is clearly subjective</b> . The problem statement may imply the solution without a clear illustration of the need or the client.
0	<i>No Evidence</i>	The identification and/or definition of the problem are <b>missing OR cannot be inferred</b> from information included.

**Guidelines for Proficiency:**

• I described the exact problem clearly, including a need and a client or market.	
• My description of the problem is not biased toward any one solution.	
• My description of the problem includes information about the background, context, or setting for the problem.	

**Element B: Understand**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	Design requirements are <b>listed with dates</b> that indicate when they were added to the list along with an <b>appropriate source</b> . The sources for the requirements should provide clear justification for why the requirement was added. The requirements are <b>consistently clear and detailed, objective, measurable</b> , and they would be <b>highly likely to lead to a tangible and viable solution</b> to the problem identified; there is evidence that requirements represent the needs of the client or customer. The sources for the requirements are logical and include evidence of market research as well as testing of initial prototypes.
4	<i>Advanced</i>	Design requirements are <b>listed with dates</b> that indicate when they were added to the list along with an <b>appropriate source</b> . The requirements are <b>generally clear and detailed, nearly always objective and measurable</b> , and they would be <b>likely to lead to a tangible and viable solution</b> to the problem identified; there is evidence that requirements represent the needs of the client or customer. The sources for the requirements are logical and <b>generally include evidence</b> of market research and testing of initial prototypes.
3	<i>Proficient</i>	Design requirements are <b>listed with dates</b> that indicate when they were added to the list, and generally include an <b>appropriate source</b> . The requirements are <b>generally clear and somewhat detailed, generally objective and measurable</b> , and they have the <b>potential to lead to a tangible and viable solution</b> to the problem identified. There is evidence that requirements represent the needs of the client or customer. The sources for the requirements are logical, and <b>at least a few include evidence</b> of market research and testing of initial prototypes. Some requirements may be solution specific.
2	<i>Developing</i>	Design requirements are <b>listed with dates</b> that indicate when they were added to the list along with meaningful sources for most of the requirements. <b>Some/all of these requirements may be incomplete and/or lack specificity</b> ; these design requirements may be only <b>sometimes objective and/or measurable</b> , and it is <b>not clear that they will lead to a tangible and viable solution</b> to the problem identified. There is some evidence that the requirements represent the needs of the client or customer. The sources for the requirements may be <b>insufficient, outdated, or of dubious credibility</b> . There may not be evidence of market research and testing of initial prototypes.
1	<i>Novice</i>	<b>An attempt is made to list, format, and document</b> research for requirements, but these generally do not include meaningful sources. The requirements may be <b>partial and/or overly general, making them insufficiently measurable to support a viable solution</b> to the problem identified. There is <b>no evidence</b> that the requirements represent the needs of, or the client or customer. The sources for the requirements are <b>overly general, outdated, and/or of dubious credibility</b> . There is no evidence of market research or testing of initial prototypes.
0	<i>No Evidence</i>	Design requirements are either <b>not presented or are too vague</b> to be used to outline the measurable attributes of a possible design solution to the problem identified. Documentation of research to support the requirements do not include sources, and is <b>essentially only the opinion of the researcher</b> . There is no evidence of market research or testing of initial prototypes.

Note: The level of requirements that a student provides differentiates between the levels. Additionally, if there are no sources (marketing research etc.), rater should begin no higher than “Developing” level.

**Guidelines for Proficiency:**

• I listed a set of design requirements (measurable things that a design would have to accomplish in order to be seen as a real solution).	
• I indicated the date on which each design requirement was added to the list.	
• I described the research that I conducted for each design requirement. For	

example, this might include background research or market research.	
<ul style="list-style-type: none"> <li>I included a source for each design requirement, such as a client, user, background research, or test results.</li> </ul>	

### Element C: Ideate

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	The process for generating possible design solutions was <b>comprehensive, iterative, and consistently defensible</b> , making a viable and well-justified design <b>highly likely</b> . <b>Multiple sketches</b> for potential solutions were provided; the <b>sketches were clear and provided sufficient detail</b> to communicate each design.
4	<i>Advanced</i>	The process for generating possible design solutions was <b>thorough, iterative, and generally defensible</b> , making a viable design <b>likely</b> . <b>Multiple sketches</b> for potential solutions were provided; the sketches <b>generally provided sufficient detail</b> to communicate each design.
3	<i>Proficient</i>	The process for generating possible design solutions was <b>adequate and generally iterative and defensible</b> , making a viable design <b>possible</b> . <b>Multiple sketches</b> for potential solutions were provided; the sketches provided some <b>detail</b> to communicate each design.
2	<i>Developing</i>	The process for generating a possible design solution was <b>partial or overly general and only somewhat iterative and/or defensible</b> , raising <b>issues with the viability</b> of the design solution chosen. <b>One or more sketches</b> for potential solutions were provided; the sketches were <b>general and provided partial details</b> about each design.
1	<i>Novice</i>	The process for generating a possible design solution was <b>incomplete and was only minimally iterative and/or defensible</b> . <b>One or more sketch</b> for a potential solution may have been provided and/or the sketches included <b>insufficient detail to communicate each design</b> .
0	<i>No Evidence</i>	There is <b>no evidence of an attempt to arrive at a design solution through an iterative process based on design requirements</b> . <b>No sketches</b> for potential solutions were provided.

Note: Student should provide more than one concept, should provide multiple ideas, and should not be merely justifying one preferred idea.

### Student checklist:

<ul style="list-style-type: none"> <li>I sketched multiple potential solutions.</li> </ul>	
<ul style="list-style-type: none"> <li>My sketches provided sufficient detail to communicate each design. (e.g.: defining main futures such as functions and materials)</li> </ul>	

**Element D: Evaluate**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	Students used a decision tool to rate each of their potential design solutions. The process for comparing possible designs solutions based on strengths and weaknesses was comprehensive, iterative, and consistently defensible. The design solution ultimately chosen was well justified and demonstrated attention <b>to all design requirements</b> .
4	<i>Advanced</i>	Students used a decision tool to rate each of their potential design solutions. The process for comparing possible designs solutions based on strengths and weaknesses was thorough, iterative, and generally defensible. The design solution chosen was justified and demonstrated attention <b>to most if not all</b> design requirements.
3	<i>Proficient</i>	Students used a decision tool to rate each of their potential design solutions. The process for comparing possible designs solutions based on strengths and weaknesses was thorough, iterative, and generally defensible. The choice of design solution was explained with reference to <b>at least some</b> design requirements.
2	<i>Developing</i>	Students may have used a decision tool to rate each of their potential design solutions. The process for generating a possible design solution was partial or overly general and only somewhat iterative and/or defensible, raising issues with the viability of the design solution chosen; that solution was <b>not explained</b> with reference to design requirements.
1	<i>Novice</i>	The proposed design was superficially reviewed based on one or two considerations. The choice of design solution <b>lacked support related</b> to design requirements.
0	<i>No Evidence</i>	There is <b>no evidence provided</b> that a design solution was reviewed through an iterative process based on design requirements.

Note: Starting from this stage the rater should start reviewing the reflection section. Student should provide more than one concept, should provide multiple ideas, and should not be merely justifying one preferred idea.

**Guidelines for Proficiency:**

• I evaluated each of my possible solutions with respect to the design requirements.	
• My reflections included explanations how I evaluated each requirement.	
• I described the strengths and weaknesses of each design.	
• I used a decision tool to rate the designs.	
• I described the solution that I decided to test, and described why I thought it was the best one to try based on the requirements.	

**Element E: Prototyping and Testing**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	The final prototype iteration is <b>clearly and fully explained</b> and is constructed with enough detail to assure that <b>all or nearly all design requirements</b> could be tested. A <b>well-supported justification</b> is provided for the requirements that cannot be tested or modeled mathematically and thus require expert review or further prototyping that is not currently feasible.
4	<i>Advanced</i>	The final prototype iteration is <b>clearly and adequately explained</b> and is constructed with enough detail to assure that <b>many design requirements</b> could be tested. A <b>generally supported justification</b> is provided for the requirements that cannot be tested or modeled mathematically and thus require expert review or further prototyping that is not currently feasible.
3	<i>Proficient</i>	The final prototype iteration is <b>clearly and adequately explained</b> and is constructed with enough detail to assure that <b>some design requirements</b> could be tested. An <b>adequately supported justification</b> is provided for the requirements that cannot be tested or modeled mathematically and thus require expert review or further prototyping that is not currently feasible.
2	<i>Developing</i>	The final prototype iteration is <b>explained only somewhat clearly</b> and/or completely and is constructed with enough detail to assure that <b>at least a few design requirements</b> could be tested. <b>There may be insufficient justification</b> for the requirements that cannot be tested or modeled mathematically and thus require expert review or further prototyping that is not currently feasible.
1	<i>Novice</i>	The final prototype iteration is <b>only minimally explained</b> and/or is not constructed with enough detail to assure that objective data on <b>at least one design requirement</b> could be determined. <b>Any attempt at justification</b> for the requirements that cannot be tested or modeled mathematically and thus require expert review or further prototyping that is not currently feasible <b>is missing</b> .
0	<i>No Evidence</i>	Any attempt to explain the final prototype iteration is <b>unclear or is missing</b> altogether. There is <b>no evidence that the prototype would facilitate testing</b> by suitable means for any of the design requirements.

Note: In the logs, the iteration is embedded in this stage. There is no separate tab for iteration.

**Guidelines for Proficiency:**

• I created detailed technical drawings for my solution.	
• Where possible, I created mathematical and computer models for the solution.	
• I built a physical model of my solution.	
• I showed that my design meets all of the design requirements.	

**Element F: Iteration**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	The project designer <b>provides a consistently clear, insightful, and comprehensive reflection</b> on, and value judgment of, <b>each major step in the project</b> ; the reflection <b>includes a substantive summary of lessons</b> learned that would be <b>clearly useful</b> to others attempting the same or similar project. There is clear evidence of iteration in the design concepts and prototypes.
4	<i>Advanced</i>	The project designer <b>provides a clear, insightful and well-developed reflection</b> on, and value judgment of, <b>each major step in the project</b> ; the reflection <b>includes a summary of lessons</b> learned that would be <b>clearly useful</b> to others attempting the same or similar project. There is clear evidence of iteration in either the design concepts and/or prototypes.
3	<i>Proficient</i>	The project designer <b>provides a generally clear and insightful, adequately-developed reflection</b> on, and value judgment of, <b>major steps</b> in the project, although one or two steps may be addressed in a more cursory manner; the reflection <b>includes a summary of lessons</b> learned, <b>at least most of which</b> would be <b>useful</b> to others attempting the same or similar project. There is some evidence of iteration in either design concepts or prototypes.
2	<i>Developing</i>	The project designer provides a <b>generally clear, at least somewhat insightful, and partially developed reflection</b> on, and value judgment of, <b>most if not all</b> of the major steps in the project; the reflection <b>includes some lessons learned</b> which would be <b>useful</b> to others attempting the same or similar project. At least one improvement was made to a design concept or prototype.
1	<i>Novice</i>	The project designer <b>provides a reflection</b> on, and value judgment of, <b>at least some</b> of the major steps in the project, although the <b>reflection may be partial</b> , overly-general and/or superficial; the reflection <b>includes a few lessons</b> learned of which at least one would be <b>useful</b> to others attempting the same or similar project. There may be no evidence of improvements or iteration, only reflections on what could be improved in the future.
0	<i>No Evidence</i>	The project designer <b>attempts a reflection</b> on, and value judgment of, at least one or two of the major steps in the project, although the <b>reflection may be minimal</b> , unclear, and/or extremely superficial; <b>any lessons learned are unclear</b> and/or of <b>no likely use</b> to others attempting the same or similar project; OR there is <b>no evidence of a reflection and/or lessons learned</b> . There is no evidence of iteration or improvement in the student design process.

Note: If the student does not provide more than one concept in the earlier stages, then iteration evidence might not exist. Again, the reflection tab is important to review for this section.

**Guidelines for Proficiency:**

• I made clear improvements to my project through an iterative design process.	
• I wrote a reflection about my design process for this problem.	
• My reflection describes the decisions I made and why I made them.	
• My reflection describes what I would do differently if I tried to address the problem again, or advice that I would give to someone else who was trying to address the problem.	

**Element G: Progression**

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	The portfolio provides <b>consistently clear, detailed, and extensive documentation</b> of the design process and project that would with <b>certainty facilitate subsequent replication</b> and refinement by the designer(s) and/or others; attention to audience and purpose was <b>abundantly evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, and the variety, quality, and suitability of supporting materials.
4	<i>Advanced</i>	The portfolio provides <b>clear, generally detailed and thorough documentation</b> of the design process and project that would be <b>likely to facilitate subsequent replication</b> and refinement by the designer(s) and/or others; attention to audience and purpose was <b>evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, and the variety, quality, and suitability of supporting materials.
3	<i>Proficient</i>	The portfolio provides <b>generally clear and thorough documentation</b> of the design process and project that would be <b>likely to facilitate subsequent replication</b> and refinement by the designer(s) and/or others, although there may be some minor omissions or inconsistencies; attention to audience and purpose was <b>generally—but not always--evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, and the variety, quality, and suitability of supporting materials.
2	<i>Developing</i>	The portfolio provides <b>partial or sometimes overly general documentation</b> of the design process and project that would be <b>unlikely to facilitate subsequent replication</b> and refinement by the designer(s) and/or others; attention to audience and purpose was only <b>sometimes/somewhat evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, and the variety, quality, and suitability of supporting materials.
1	<i>Novice</i>	The portfolio provides <b>minimal documentation</b> of the design process and project that would <b>not facilitate subsequent replication</b> and refinement by the designer(s) and/or others; attention to audience and purpose was <b>rarely evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, and the variety, quality, and suitability of supporting materials. The portfolio contains documentation of each step of the process, but no iteration or improvement based on the design requirements; that is, the portfolio indicates design fixation.
0	<i>No Evidence</i>	The portfolio <b>attempts to document</b> the design process and project but <b>little/none of that information supports subsequent replication</b> and refinement by the designer(s) and/or others; <b>little/no attention to audience and purpose was evident</b> in the choice of mode(s) of presentation, professionalism of style and tone, or the variety, quality, and suitability of any supporting materials included. The process as documented is linear, indicating early design fixation and no subsequent improvements based on the design requirements.

Note: If only one concept is provided, there is not much evidence of progression.

**Guidelines for Proficiency:**

• My portfolio includes relevant documentation of each stage of the design process.	
• My portfolio provides enough detail to guide someone else in following my procedure.	
• My portfolio indicates that I followed a true engineering design process driven by customer needs and requirements, and that multiple solution candidates were considered and improved throughout the process.	



**Element H: Communicate your Solution\***

Score Point	Performance Level	Performance Level Description
5	<i>Exemplary</i>	<p><b>Content:</b> Presentation communicates a design solution or product idea in an extremely clear and compelling manner, exhibiting expertise on the solution being presented. Presentation includes three or more types of data (financial, stakeholder, test results, research), ideally visualized and analyzed, to justify design decisions and/or present a compelling sales pitch. A designed solution is communicated clearly using at least two of the following: physical prototypes, drawings, and renderings as appropriate. The presentation is audience appropriate. For a sales pitch, relevant financial data is included. For a design review, relevant technical details and models are included.</p> <p><b>Skill:</b> Presenter(s) spoke clearly with appropriate pace and pauses, made eye contact with the audience, did not read off of slides, exhibited appropriate posture, kept audience engaged, and adhered to the time limits.</p>
4	<i>Advanced</i>	<p><b>Content:</b> Presentation communicates the topic in a clear and compelling manner, exhibiting a high level of knowledge on the solution being presented. Presentation includes at least two types of data (financial, stakeholder, test results, research) with appropriate analysis and visualizations to justify design decisions and/or present a compelling sales pitch. A designed solution is communicated using at least one of the following: physical prototypes, drawings, and renderings, as appropriate. The presentation is audience appropriate.</p> <p><b>Skill:</b> Presenter(s) spoke clearly, did not read off of slides, and adhered to the time limits.</p>
3	<i>Proficient</i>	<p><b>Content:</b> Presentation communicates the topic in a somewhat clear and compelling manner. Presentation exhibits some use data to justify design decisions and/or present a compelling sales pitch. There is some evidence of data analysis and visualization. A designed solution is communicated using physical prototypes, drawings, and renderings, as appropriate, but some details may not be clear. Presentation is mostly audience appropriate.</p> <p><b>Skill:</b> Presenter(s) adhered to the time limits and did not read off of slides.</p>
2	<i>Developing</i>	<p><b>Content:</b> Presentation communicates a clear design solution or a clear use of data, but maybe not both. The presentation contains some visual media and a description of the solution. The presentation may not be tailored to the appropriate audience.</p> <p><b>Skill:</b> Presenter(s) adhered to the time limits.</p>
1	<i>Novice</i>	Presentation shows work and effort but is vague or missing key elements necessary to communicate the solution, or, presentation quality is lacking even if designed solution is complete.
0	<i>No Evidence</i>	Presentation does not communicate the topic.

Note: Team discussed that this is an important element to determine student understanding of EDP. \* Note: Adapted from SmartLab Project Self-Assessment Rubric.

**Guidelines for Proficiency:**

<ul style="list-style-type: none"> <li>• My presentation communicates my design or solution clearly, including models, renderings, and prototypes as appropriate (more than one item from this list required for 4 or 5).</li> </ul>	
<ul style="list-style-type: none"> <li>• My presentation incorporated data from multiple sources, including visualizations (more than one data source required for 4 or 5).</li> </ul>	
<ul style="list-style-type: none"> <li>• My presentation showcases my expertise in using the software, hardware, or materials that my group used to make our solution.</li> </ul>	
<ul style="list-style-type: none"> <li>• I designed my presentation for the appropriate audience.</li> </ul>	
<ul style="list-style-type: none"> <li>• I adhered to presentation standards for eye contact, articulation, posture, and timing.</li> </ul>	