The Education Design Lab Creative Problem-Solving Badge

Mapping Guide

This document will guide you through the process of mapping your programs/courses/activities to the Education Design Lab’s creative problem-solving micro-badge.

**What is the creative problem-solving micro-badge?**

The Education Design Lab’s creative problem-solving micro-badge recognizes students for their capacity to solve problems in new ways.

This badge is made up of four sub-competencies. In order to obtain the creative problem-solving badge, students have to adequately meet all four of these competencies.

**What are the four sub-competencies?**

* **Exercise Convergent and Divergent Thinking**
  + Individuals generate fresh ideas and apply a process for evaluating them
* **Manage Ambiguity**
  + Individuals trust the process; manage their own anxiety; and gather information before settling on solutions prematurely
* **Identify Patterns**
  + Individuals make sense of data; recognize commonalities among seemingly unrelated situations; and frame novel problems in familiar terms
* **Apply an Iterative Process**
  + Individuals systematically test ideas; challenge their own preconceptions, and expand the range of potential solutions

**How do I map?**

You simply take what you are already doing/assigning in your program or course and map it to the four sub-competencies. You will use the Education Design Lab’s rubric to determine that the learner met the proficiency standard. Some students enrolled in a course or participate in training may not meet the competency level to earn the badge. Instructors/Staff make this determination using the rubric.

**Think about your course/program:** Where in the training/curriculum are the learners developing these skills/competencies?

What assignments and activities offered in your course/program match each of the sub-competencies? Write those assignments/activities in the table below. The learner may demonstrate competence during your course/program or at the end.

**Mapping Your Assignments**

**Define the Problem** Write a problem statement that includes the design task objectives, constraints, rules, design strategy and priorities.

**Research the Problem** Gather information to share with your group (written report, PPT, oral presentation, etc teacher has options). Use the following questions as a guide. What types of designs are already in use? What types of designs are used for similar applications? (ex: boats, buoys, weather sensors, pool toys, etc) How do those designs work? What scientific concepts do you need to apply to your design?

**Design Process: Ideation** Devise at least 3 models that could work for the platform design. The models should be significantly different from each other. Include sketches or CAD drawings to visualize the models. Include preliminary material ideas and cost estimates.

**Design Process: Selection** Create a Pugh Chart based on the judging criteria and any other relevant criteria for sourcing and building the models. Weigh each criteria according to the Design Strategy outlined in the Problem Statement. Use the Pugh Chart to assess each model. Option to build small scale models to gather additional data for assessment on performance, ease of construction, etc. Analyze the results and choose the best model for construction.

**Design Process: Testing Plan** Analyze your design features, materials, and likely construction steps to identify 3 potential trouble spots or failures. Develop a plan for collecting data about these likely trouble spots in your selected design prior to Windstorm Competition Day. This could involve building small scale models to experiment with construction techniques, gathering feedback from others on design aesthetics, testing full scale models in a community pool or large water tank, etc. The plan should include what you will test, how you will test, and why the test will be useful.

**Engineering Notebook** Collect any pre-construction data included in your Testing Plan. Record testing results and note any decisions made or alterations to your design in your Engineering Notebook. Construct your platform. Use your Engineering Notebook to record any problems that arise during construction and the solutions you chose. Carry out any remaining parts of your Testing Plan. Analyze the results to determine if design modifications are required. Refer back to the science concepts to determine causes of any design failures. Go back to the Design Process Ideation, Selection and Testing framework if needed. You may need several cycles to get the design to work the way you want, this is normal! Keep track of all changes to the design in your Engineering Notebook. Make sure you have a clear record of all the final materials and design elements.

**Final Reflection** Reflect on your experience participating in the Windstorm Challenge. Limit of 750 words. Include the following sections:

* Windstorm Debrief: What went well, what went wrong, how could you improve? Address technical performance, design, and presentation experience.
* Skill Assessment: What skills did you learn? Provide examples of your skill progression throughout the project.
* Future Goals: Discuss how the skills you developed will help you achieve success in the future, either in school or in your career.

**Assessment note:** Educators will assess all the assignments, after training provided by ASCC staff on using rubrics, except the Final Reflection which will be assessed by ASCC faculty or staff. Learners can meet the requirements prior to completing the Final Reflection. Educators will assess each assignment separately, using only the criteria identified as applicable. ASCC staff will compile the results from all assignments to determine if all criteria have been met for issuing the badge. Each criterion has at least two opportunities to show competency; learners need only show competency once to meet the criterion.

**Divergent and Convergent Thinking:** Tying Up Loose Ends

Individuals generate fresh ideas and apply a process for evaluating them

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| **Criteria** | **Assignments/Activities within the**  **course/program** |
| Generates several distinct ideas  (e.g., through brainstorming or other techniques) to produce different ideas- Generates ideas | Design Process: Ideation (Team document)  Final Reflection (Individual) |
| Selects interesting ideas and evaluates them by applying a known, evaluative process(es) Selects and evaluates ideas | Research the Problem (Individual)  Design Process: Selection (Team) |
| Applies criteria to rank/understand ideas/preferences (e.g., usefulness, feasibility, novelty, and consumer appeal) Develops and applies criteria | Research the Problem (Individual)  Design Process: Selection (Team) |
| Can select ideas and reflect on the process; Considers whether the process worked to identify the best idea(s)/preferences Reflects on the Decision Process | Design Process: Selection (Team)  Engineering Notebook (Individual)  Final Reflection (Individual) |

**Identify Patterns: Finding Your Pattern**

Individuals make sense of data; recognize commonalities among seemingly unrelated situations; and frame novel problems in familiar terms

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| **Criteria** | **Assignments/Activities within the**  **course/program** |
| Answers questions in depth; Gives thorough and thoughtful responses, when asked | Define the Problem (Individual)  Research the Problem (Individual)  Engineering Notebook (Individual)  Final Reflection (Individual) |
| Makes sense of data and Identifies patterns/commonalities using mind map or other techniques Identifies Patterns | Research the Problem (Individual)  Engineering Notebook (Individual) |
| Provides thoughtful reflection on patterns;  Reflects on the meaning of patterns; Can frame novel problems in familiar terms  Reflects on patterns | Research the Problem (Individual)  Design Process: Ideation (Team)  Engineering Notebook (Individual) |

**Manage Ambiguity**

Individuals trust the process; manage their own anxiety; and gather information before settling on solutions prematurely

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| **Criteria** | **Assignments/Activities within the**  **course/program** |
| Trusts the process and outlines clear and well-defined steps to a solution(s)  Trusts the process | Design Process: Selection (Team)  Design Process: Testing (Team) |
| Manages ambiguity and assesses consequences; Identifies and discusses conclusions, implications, and consequences | Design Process: Testing Plan (Team)  Engineering Notebook (Individual) |
| Gathers information before settling on solutions prematurely; Can develop an action plan that describes an alternative solution  Alternative Solutions | Design Process: Ideation (Team)  Design Process: Testing Plan (Team)  Engineering Notebook (Individual) |

**Apply an Iterative Process**

Individuals systematically test ideas; challenge their own preconceptions, and expand the range of potential solutions

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| **Criteria** | **Assignments/Activities within the**  **course/program** |
| Recognizes assumptions made (e.g., reflective of their own preconceived notions) | Design Process: Testing Plan (Team)  Engineering Notebook (Individual) |
| Utilizes strategies to test ideas/assumptions  (e.g., can call out the methods used to systematically test the assumptions made)  Tests ideas | Design Process: Testing Plan (Team)  Engineering Notebook (Individual) |
| Distills learning from feedback and/or reflection of assumptions made; Applies relevant feedback/reflection; Can expand the range of potential solutions  Applies feedback | Engineering Notebook (Individual)  Final Reflection (Individual) |
| Demonstrates learning and reflective awareness; Can articulate learning/reflection about the iterative process and how you can use it in the future  Reflects on iterative process | Engineering Notebook (Individual)  Final Reflection (Individual) |

**Creative Problem-Solving Badge Rubric EXAMPLE**

**INSTRUCTIONS:**

Complete the rubric for each learner who demonstrated proficiency within the sub-competencies defined below.

**Learner name(s):**

**Rubric completed by:**

**Name of Course/Program:**

**Divergent and Convergent Thinking: Tying Up Loose Ends**

Individuals generate fresh ideas and apply a process for evaluating them

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| **Criterion** | **Description** | **Yes** | **Not Yet** |
| Generates several/many distinct ideas | You can generate ideas through brainstorming or other techniques to produce several ideas |  |  |
| Applies an evaluative process | You can select interesting ideas and evaluate them by applying a known process(es) |  |  |
| Applies criteria to rank/understand ideas/preferences (e.g., usefulness, feasibility, novelty, and consumer appeal) | You applied criteria to rank/understand preferences |  |  |
| Can select ideas and reflect on the process | You considered whether the process worked to identify the best idea(s)/ preferences |  |  |

**Identify Patterns: Finding Your Pattern**

Individuals make sense of data; recognize commonalities among seemingly unrelated situations; and frame novel problems in familiar terms

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| --- | --- | --- | --- |
| **Criterion** | **Description** | **Yes** | **Not Yet** |
| Answers questions in depth | You give thorough and thoughtful responses, when asked |  |  |
| Makes sense of data and identifies patterns/commonalities using mind map or other techniques; | You utilize mind map or other techniques to identify patterns |  |  |
| Provides thoughtful reflection on patterns; Can frame novel problems in familiar terms | You reflect on the meaning of patterns |  |  |

**Manage Ambiguity**

Individuals trust the process; manage their own anxiety; and gather information before settling on solutions prematurely

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| **Criterion** | **Description** | **Yes** | **Not Yet** |
| Outline Solution | You trust the process and outline clear and well-defined steps to solution |  |  |
| Assessment of consequences | You manage ambiguity and identify and discuss conclusions, implications, and consequences |  |  |
| Present an alternative | You gather information before settling on solutions prematurely; Your action plan describes an alternative solution |  |  |

**Apply an Iterative Process**

Individuals systematically test ideas; challenge their own preconceptions, and expand the range of potential solutions

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| **Criterion** | **Description** | **Yes** | **Not Yet** |
| Identifies assumptions made | You recognize assumptions made (e.g., may be reflective of preconceived notions) |  |  |
| Utilizes strategies to test assumptions | You call out the methods used or utilize strategies to systematically  test the assumptions made |  |  |
| Applies relevant feedback/reflection | You distill the learning from feedback and/or reflection of assumptions made and can apply it |  |  |
| Demonstrates learning/reflective awareness | You can articulate your learning/ reflection about the  iterative process and how you can use it in the future |  |  |

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