



iLEAD PROJECT DESIGN GUIDE

Version 1.2

*Under every project there is an **authentic and cross-disciplinary challenge**.
Always begin with the “Why” - What can the learners do with what they know?*

Project Name:	Estimated Duration:	Grade Level:
DreamUp to Space, Mission 2018	5-7 weeks	4-12, K-12 art component
<u>Begin with the “Why” - What is the purpose of the project?</u>		
<i>DreamUp provides space-based education to students and entrepreneurs. The first company bringing space into the classroom and the classroom into space, DreamUp is uniquely positioned to engage kids globally with the most cutting-edge space research and developments, and inspire them through scientific discoveries in orbital and suborbital space. DreamUp has a proven track record, having brought over 375 student research payloads worldwide to the International Space Station (ISS), working with student groups around the globe to ensure their experiments are approved for and manifested on SpaceX and Orbital rockets for launch to the ISS. DreamUp’s team of experts has integrated hundreds of payloads through our special relationship with launch services provider NanoRacks and their Space Act agreement with NASA that allows access to the most advanced platforms on board the ISS.</i> Through a partnership with DreamUp, this project <i>provides the opportunity for our learners to become pioneers of space science, by providing a comprehensive educational experience, supporting scientific research and innovation efforts connected to space exploration. Learners will develop and use the engineering design process to design, test, and submit their own proposal for an experiment that can be run on the International Space Station. This project seeks to engage learners in many real-life scenarios and activities that will help them develop, refine, and further SEL, academic, and professional lifelong skills and habits.</i> iLEAD’s goal is to engage, challenge and inspire young people and facilitators as they explore the challenges and opportunities that are part of Space exploration.		



CHALLENGING PROBLEM/QUESTION

Driving Question(s)

How can I use scientific experimentation to design an experiment that could be run on ISS?

Suggested inquiry plan:

- *How does scientific experimentation help us better understand gravity and microgravity?*
- *How do things behave on the surface on the earth and in space? (gravity and microgravity)*
- *How do scientists pose and answer important questions?*
- *Based on my understanding of microgravity experimentation and my own interests, how can I develop and idea into an experiment within the MixStix mini-lab constraints?*
- *In order to develop my experiment design, what resources and mentors do I need?*
- *How will I use others' research to further my own?*
- *What would be the best way to allocate the right resources and mentors for my experiment design? (workshop on letter writing, seeking resources, mentorship)*
- *What process can give my work a "voice"? (writing a proposal)*

DEEPER LEARNING AND ACADEMIC MINDSET

Learning Targets	RUBRICS (<u>SEL</u> and <u>AR</u>)	<u>Interdisciplinary Connections/ Makery/Exploratorium</u>
EXAMPLE: Science and Engineering Practices: 1. Asking questions (for science) and defining problems (for engineering) 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking	SEL: Begin with the end in Mind (Grit, Purpose) AR: LEADERSHIP (Collaboration and Teaming) DESIGN (Thoughtful Work-Evaluate the Proposal) Project Specific:	Example: Science: Biological, Chemical and Physical Scientific Research; Experimentation; Micro-lab experiments ELA: Expository writing/Proposal writing; presentations; research, communications Engineering Practices; Design Principles; Project Cycle; constraints Art: Visual Art- Mission Patch Design competition Humanities/Social Studies: History of projects; concepts; space exploration through time Technology: Collaboration through google docs and slides



6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information 5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: “Down” is a local description of the direction that points toward the center of the spherical Earth.] [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.]	1: <u>Mission Specialist Team</u> 2: <u>Proposal Writing Checklist+Proposal Writing Rubric</u> 3: <u>Past SSEP Experiment Reflection</u> 4: <u>Mission Patch Design</u> 5: Scientific Experimentation Proposal and Process Rubric <u>SSEP Facilitator Every Event reflection</u>	Makery: Use of Nanno-rex FME lab as constraint for experimental design Exploratorium: 3D printer, ISS with Autodesk
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SEL: Begin with the End in Mind

GRIT <i>Learner uses perseverance and passion to accomplish long term academic goals. Learner explores local and global concepts using critical and creative thinking skills.</i>	<i>Learner's Reflection: How did I surpass expectations?</i>	<i>I ALMOST ALWAYS finished whatever I began and stuck with a project or activity for more than a few weeks. I ALMOST ALWAYS tried very hard even after experiencing failure; I ALMOST ALWAYS stayed committed to goals and kept working hard even when I felt like quitting</i>	<i>I SOMETIMES finished whatever I began and stuck with a project or activity for more than a few weeks. I SOMETIMES tried very hard even after experiencing failure; I SOMETIMES stayed committed to goals and kept working hard even when I felt like quitting</i>	<i>I ALMOST NEVER finished whatever I began and stuck with a project or activity for more than a few weeks. I ALMOST NEVER tried very hard even after experiencing failure; I ALMOST NEVER stayed committed to goals and kept working hard even when I felt like quitting</i>
PURPOSE	<i>Learner's</i>	<i>I was ALMOST ALWAYS</i>	<i>I was SOMETIMES</i>	<i>I was ALMOST NEVER</i>



Demonstrates purpose through resourcefulness and resiliency, learner is driven by a cause larger than oneself to explore new ideas and innovative strategies.	<i>Reflection: How did I surpass expectations?</i>	<i>oriented toward a stated future goal; I was/am ALMOST ALWAYS able to articulate an interest and the “why” behind the interest</i>	<i>oriented toward a stated future goal; I was/am SOMETIMES able to articulate an interest and the “why” behind the interest</i>	<i>oriented toward a stated future goal; I was/am ALMOST NEVER able to articulate an interest and the “why” behind the interest</i>
AR: Leadership				
Collaboration and Teaming - <i>working with others towards a common outcome; team up and move on as needed</i>	Learner’s Reflection: <i>How did I surpass expectations?</i>	I ALMOST ALWAYS demonstrated productivity through strong interpersonal communication (peer or group), a commitment to shared success, leadership, and initiative.	I SOMETIMES demonstrated productivity through interpersonal communication (peer or group), a commitment to shared success, leadership, and initiative.	I ALMOST NEVER demonstrated productivity through interpersonal communication (peer or group), a commitment to shared success, leadership, and initiative.
Design: Thoughtful Work (Experiment Design)				
Academic rigor (critical thinking & knowledge)* *Deeper Learning (understanding of the knowledge and skills; Vocabulary of the discipline, mastery of standards)	Learner’s Reflection: <i>How did I surpass expectations?</i>	I designed an experiment and wrote a proposal that is submitted to Step 1 Review Board, analyzing and synthesizing the SSEP related scientific experimentation concepts. Evidence: design an	I designed an experiment and wrote a proposal that is not submittable to Step 1 Review Board that demonstrates my understanding of the SSEP related scientific experimentation concepts. Evidence: design an	I designed an experiment and wrote a proposal that partially shows evidence of the SSEP related scientific experimentation concepts. Evidence: design a partial experiment within the constraints of FME lab; posing questions;



		experiment within the constraints of FME lab; posing authentic questions; showing evidence of changing one variable; conducting a ground truth experiment; connecting my research to a field-related mentor.	experiment within the constraints of FME lab; posing questions; showing understanding of changing one variable; wrote a proposal	showing knowledge of changing one variable; wrote a partial proposal
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SUSTAINED INQUIRY

What happens between the Entry Event and the POL that keeps the learners engaged?

Performance Tasks

EXAMPLES:

- Q and A with entry event guest speaker/video/event etc
- “Knows” and “Need to Knows” with facilitators followed by brainstorming session in class
- Learner prep for guest speaker/video/event etc
- Mission patch concept
- Mission patch design
- Microgravity activities
- Scientific proposal writing
- Mission patch story (What is the story behind my design?)
- Mission Specialists learner presentation using google slides
- Weekly/Daily Journaling to a prompt (scientific/ELA/Humanities Prompts)
- Reflections, for presentations
- Opportunity to experience Free fall, related to ISS
- Journaling the project journey



COMMON PERFORMANCE TASKS:

- Project Proposal (team or individual) [LINK TEMPLATE AND FORMS HERE](#)
- Proposal Presentation (at Project and Proposal Reveal, March 2018, COC) [GUIDELINES HERE](#)
- Mission Patch Design [GUIDELINES HERE](#)

Differentiation

Different approaches to presenting resources, materials and activities: Videos, guest speakers; cross-disciplinary activities; team collaboration; mentorship; individual and group conferencing; expert guidance:

- Team roles
- Graphic organizers
- Adaptation of proposal materials
- Coaching
- Peer and adult collaboration

AUTHENTICITY

Presentation of Learning (*How will the learners showcase their answers to the Essential Question to an authentic audience?*)

Authentic Audience: Site-based Communities' Step 1 Review Boards; Finalist proposals then submitted to the a final review board Step Two Review Board with expert panelists for selection of the flight experiments.

Format: Flight Experiment Design Competition presented at College of the Canyons in front of cogges, universities and their communities.

Setting: Event at College of the Canyons, where learners get to present their projects/proposals and interact with audience.

Entry Event (*How will the learners become engaged, curious, and begin thinking about the Driving Question?*)

EXAMPLES:

- NASA Ames, Chief Scientist Dr. Jacob Cohen, or Al Bowers (Guest Speaker for DreamUp Entry Event)- presenting to learners at each school site.
- Watch videos from previous years that learners have created: [LINK VIDEOS HERE](#)



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NEXT STEPS

Resources /Community Connections Needed:

REQUIRED:

- DreaUp Materials
- Experiment design-related mentors
- Experiment design workshops
- Proposal writing workshops

Critical Friends/Data Protocol Reflection *(What did you take away from these discussions? What part of this project design needs to be changed?)*

CALENDAR

POST PROJECT REFLECTION

Project Reflection (After the POL)

Questions to Consider:



How am I using my learners' interests to create authentic projects?

Where will voice and choice create empowerment for my learners?

What content knowledge is essential for my learners to understand and master the project?

What do learners know and believe about their own skills and disposition?

How can I connect my learners with a community organization that is involved with this essential theme?

How will the learning experience be transformative for the learner?

Will the project make a difference outside the classroom?

How am I using previous assessment data to drive my curriculum?

How will this project create a continuum of learning?

How is technology supporting rich and innovative ways of learning?

How will the project foster creativity and design?