Unit Planning Template

Unit Designer: Amy Leidtke Title: **Innovating Minds and Hands: Fetching Design**

Grade Level (s): 6 - 12 Discipline(s): Engineering, Visual Arts, Design, Literacy

School: SmART Schools Institute, August 15-19, 2011 Time Frame: 2 ½ hours/ between 1-10 60 min blocks

Introduction

This project contains a sampling of useful curriculum tools for educators to use as inspiration for developing their own projects. The exercises reflect real-world visual arts studio experiences (those which occur in design and engineering disciplines).

The project promotes learning design-based skills, including brainstorming, mastering form and material, solving problems, working in groups, and thinking creatively and strategically.

This project contains important elements of invention, discovery, and play.

Core Design Principles

This project is developed with the notion of inspiring design thinking. Guiding principles for the development of this project include the following:

***Sustainability** – Utilize earth-friendly materials, those that are made from recycled content, and whenever possible those materials that have been temporarily removed from the recycling stream. Promote ideas of sustainability through not only practice, but also through discussion and example.*

***Innovation** – Encourage creativity and invention through open-ended exploration, be it through ideation, material investigation, and testing.*

***Curiosity** – Ignite curiosity through hands-on experiences.*

***Curriculum-based** – Encompass a wider curriculum connection, including science, math, language arts, social studies, and other subjects.*

***Fun** – Great fun factor is paramount to student engagement.*

***Success** – Offer accessible activities, ensuring students a high rate of success and a sense of achievement.*

***Process-oriented** – Embrace creative thinking and promote problem-solving skills, and know that experiencing the design process can be just as significant, if not more meaningful than successfully completing a project.*

***Experiential** – Provide highly interactive, meaningful, hands-on experiences that students can get excited about.*

***Participatory** – Involve students in projects on multiple levels, encouraging participation through inquiry, investigation, observation, interaction, experimentation, testing, and reflection.*

With these guiding principles, the purpose is to provide skill-based design exercises that excite the imagination and increase learning potential.

– Excerpt, adapted for this particular project, from Design Connections: Curriculum Tools for Design Education, by Amy Leidtke. This booklet includes a set of design skill-building projects for middle and high school students.

STAGE ONE: Identify Desired Results

What do we want students to know, understand, and be able to do?

Unit Overview

What will be studied and why?

How does this study ask fundamental questions about the content or discipline(s) being studied?

This project is a hands-on industrial design investigation developed and designed for G6-12 youth and their educators. Participants will use design methodologies and design thinking, important twenty-first century skills for innovation, to explore and compare two different tools, the atlatl (an archaic tool used to throw atlatl darts) and a dog toy (a modern day tennis ball launcher). The ultimate payoff for completing this series of exercises is to takeaway the experience of the design process, using the knowledge to think like designers, employing a variety of methods to solve design challenges/problems.

Looking through a series of multidisciplinary lens (anthropology, archeology, psychology, history, research, technology, engineering, art, design, ergonomics, physics, and math), participants will discover the many ways humans use design thinking as a way to solve problems – to empathize with others, understand complex variables, conduct research, develop hypotheses, model possible solutions through trials, collect and measure data, generate possible solutions and new concepts, refine work based on observations and reflections, present ideas, and demonstrate work.

Design Explorers of the unit "Innovating Minds and Hands: Fetching Design" will work through real-world design processes to think about issues including but not limited to ideation, teamwork, iterative design, human factors, user scenarios, physics, engineering, safety considerations, materials, styling, instructions, safety, and packaging. Depending upon the time allotted, the unit culminates with a variety of outcomes, with students experiencing the opportunity to design, build, test and modify their very own object, either/both an atlatl tennis or/and a ball launcher.

This unit is full of possible meaningful extensions. Engaged students and teachers alike will be inspired to further develop the activity, making improvements to the content and targeting specifically towards their specific area(s) of interest and curiosity, criteria, needs, and wants. Who knows what would become of it… a new product idea, an educational exhibit, a theatrical production, a game, a sport… the possibilities are exciting.

Figure 1: An atlatl with atlatl dart.

Figure 2: A ball-thrower ("ChuckIt!"), with tennis ball

Enduring Understandings *What are the big ideas that give meaning and importance to the facts studied?* *What are the big understandings that reside at the heart of the study, that you want students to uncover and attempt to understand through this study?*	• People are inherently problem-solvers. • People, given similar motivations, will often solve a problem in very similar ways, across time, culture, distance, etc. • Innovation requires motivation, ingenuity, technology, trial and error, and perseverance.
Essential Questions *What are the relevant, meaningful questions that will encourage deep exploration of ideas?* *What universal, compelling question(s) will focus the study and the final performance of student learning?*	Essential Questions • How was it that peoples, given no contact with one another over time, continent, or media, generated similar solutions to a problem? • What role does motivation play in the innovation process? • What does it mean to be a designer today? How is that different or similar to what it meant when tools like the atlatl were designed? Focusing Questions • What is an atlatl? How does it function? What is it capable of doing? What are the components? How does it compare to the dog toy? How are the objects similar? How are they different? • How does the object work? How does one hold it? What are the components? Is there skill involved? • How does weight factor in the design? How does energy factor in the design? How does distance factor in the design? What other factors are relevant to the design? • How many different ways might there be to hold the object? How many different ways are there to hold a tool, not just the atlatl and/or ball-thrower? How can the handle be made to feel comfortable in the hand? • If you had any materials available, what would be suitable materials for the object? How will those components be joined securely? • What other objects serve a similar function as the atlatl/ball launcher? How is it that these scenarios are similar?
Desired Outcomes for Student Learning/ Standards *What do I want students to know, understand, and be able to do?* *What skills or insights do I expect them to gain?* *How do these ideas align to state and/or national standards and/or graduation*	**Rhode Island Visual Arts GSEs:** **Visual Arts and Design Enduring Understanding 1 Creative Processes – Visual Art and Design is the process of creative problem solving using both traditional and innovative media, tools, techniques, and processes in order to make the imagined visible.** **VAD 1 (7-8)-1 Students demonstrate knowledge and application of Visual Art and Design concepts by.** a. applying VAD concepts for intended purposes and analyzing the effects: line, shape, form, texture, space (positive/negative), color schemes/groups, color properties (hue, value, intensity), organization of visual compositions, emphasis/focal point, pattern, repetition, balance (symmetrical/ asymmetrical), contrast, rhythm, proportion, and movement **VAD 1 (9-12) –1 Students demonstrate knowledge and application of Visual Art and Design concepts by…** a. applying a variety of selected VAD concepts for two- and three - dimensional works of art and interpreting and evaluating the effects **Visual Arts and Design Enduring Understanding 2 Cultural Contexts – Visual Art and Design**

requirements? (Include all standards for all disciplines being assessed that align with desired outcomes)	**creatively expresses the values and ideas of human experience, community, and civilization.** **VAD 2(7-8)-1 Students demonstrate knowledge and understanding of the role of Visual Art and Design in personal, cultural, and historical contexts by.** **b.** analyzing the connections between Visual Arts and Design and other disciplines (e.g., the relationship between music and visual arts and design concepts such as color and repetition) **VAD 2 (9-12) –1 Students demonstrate knowledge and understanding of the role of Visual Art and Design in personal, cultural, and historical contexts by.** b. analyzing the connections between Visual Arts and Design and other disciplines (e.g. ceramics and chemistry, sculpture and physics, designing and engineering) **Visual Arts and Design Enduring Understanding 3 Communication – Visual Art and Design is a vehicle for expression and communication through the use and development of metaphor and symbol systems.** **VAD 3 (7-8) –1 Students demonstrate the ability to communicate in the language of Visual Art and Design by.** a. creating a unique solution for a visual art or design problem (e.g., designing a percussion instrument that makes several sounds) **VAD 3 (9-12) –1 Students demonstrate the ability to communicate in the language of Visual Art and Design by...** a. creating a unique solution for a visual art or design problem (e.g., create a researched blueprint design of a renovation for an area within the school) **Visual Arts and Design Enduring Understanding 4 Aesthetic - Applying knowledge of Visual Art and Design in order to reflect on and evaluate the work of self and others.** **VAD 4 (7-8) –1 Students reflect upon, analyze and evaluate the work of self and others by...** a. describing subject matter, media, techniques, processes, craftsmanship, and basic visual arts concepts seen in a work of art or design b. interpreting and evaluating one visual art or design work based on analysis of description and when and by whom the work was done c. analyzing creative elements in the work d. asking questions about other's artwork relating to subject matter, media, and visual arts concepts and about when and where the work of art or design was created (e.g., From which region in the world was the artist?) **e.** contributing in individual or group discussions about work in which the student gives and receives constructive criticism **VAD 4 (9-12) –1 Students reflect upon, analyze and evaluate the work of self and others by...** a. describing subject matter, media, techniques, processes, craftsmanship and relevant visual arts concepts seen in a work of art or design b. interpreting and evaluating a visual art and design work based on analysis of description and when and by whom the work was done c. evaluating creative elements in the work d. researching specific questions relating to social and symbolic context, how, when, and where the work of art or design was created (e.g., What are important symbols of contemporary Latino cultures?) e. contributing in individual or group discussions about work in which the student gives and receives constructive criticism **Common Core Standards: Speaking and Listening – Comprehension and Collaboration** **Grade 8:** 1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals

and deadlines, and define individual roles as needed.
c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

Grades 9 – 12:

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

Presentation of Knowledge and Ideas – grades 9-10

4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Common Core – Mathematics

Standards for Mathematical Practice (pages 6 – 8)

1 Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
7. Look for and make use of structure.

National Science Standards – Physical Science

M.B.2 Motion and forces

a. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.
b. An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
c. If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in the speed or direction of an object's motion.

H.B.4 Motions and forces

a. Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship F = ma, which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.
b. Gravitation is a universal force that each mass exerts on any other mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.

STAGE TWO: Determine Acceptable Evidence

How will we know if students have achieved the desired outcomes and met the standards?

What will we accept as evidence of student understanding and proficiency?

Assessment

How will I know if students have achieved the desired outcomes and met the standards?

What will I accept as evidence of student understanding and proficiency? How will I communicate this to students?

How will I evaluate student evidence of learning the desired outcomes?

How will I offer students the opportunity to expand on and apply what they've learned?

How will students have an opportunity for self-evaluation and/or revision?

Students will be assessed on the following:

- Journal/Sketchbook
- Design Iterations
- Final Product
- Participation

In addition, students will be assessed on their ability to demonstrate understanding of the project's design process:

- **Understanding the design challenge**
- **Conducting research** and exploring the atlatl as a design concept;
- **Testing, experiencing, and observing** (first-hand) atlatls as well as a several models of ball launchers;
- **Discussing and comparing** assumptions, questions, physical properties, design elements, lateral products (those that which are similar to the atlatl and/or ball launcher) and project hypotheses based on these reflections;
- **Brainstorming** possibilities, using mind-mapping and rapid sketching in 2-D drawing and 3-D modeling;
- **Developing and designing** multiple form iterations, further visualizing and modifying the concepts, using a variety of modeling materials and drawing supplies to sketch concept variations;
- **Creating** an object in 2-D (drawing, labeling, dimensioning a scaled drawing) and 3-D (modeling in full scale); and finally
- **Critiquing, reflecting, documenting, exhibiting, and demonstrating** the work, explaining the utilitarian function, describing the cultural context, discussing the design process, sharing the work progression, illuminating the findings, and instructing others how to use the resulting product.

STAGE THREE: Plan Learning Experiences and Instruction

What teaching and learning experiences will equip students to demonstrate the targeted understandings?

Develop the Instructional Plan

What is the scope and sequence of activities that lead to student success on the assessment(s) and academic rigor?

Do activities require that students ask deep questions about their learning?

Are there opportunities for students to develop language and conceptual understandings related to content?

Are there opportunities for meaning-making and personal reflection on the part of students?

Are students encouraged to revise and produce quality work?

Do the activities provide multiple entry-points and accommodate for different learning styles?

Is the teacher spending her time coaching, conferencing, leading, participating, and sharing responsibility for learning with the students?

The **design challenge** for this workshop will be t*o design and construct a ball-launching device, using similar principles found in the archaic tool, the atlatl (dart-thrower).* In order to solve the design challenge, we will utilize the **design process**, a multidisciplinary approach to **problem-solving**. It will require us to think about the object in terms of culture(s), technologies, motivation(s) for making, utilitarian function, lateral object comparisons, engineering, physics, design, invention, and much more.

Outlined below are the steps involved in a basic design process.
Students will:

1. Review the Design Brief, which describes the project, identifies the deliverables and schedule, outlines the process, and stipulates the evaluation criteria.
2. Review project Design Principles.
3. Review the Project Rubric that clearly indicates expectations in terms of participation, journal/sketchbook, and end product.
4. Review the Vocabulary, the key words/phrases and definitions that the students will be asked to incorporate into verbal and written works. Sample vocabulary includes words such as hyperbolic tangent, spring energy, acceleration, velocity, spring mass system, launch, force, propel, arch, distance, etc.)
5. Explore the Investigation Toolkit, moving through a variety of important design exercises (for example, discovery boxes that include experiments, fun facts, key ideas, relevant questions, props, and the like) that will guide the discovery.
6. Create an Idea Map to broaden their understanding of the project possibilities and the project's greater implications outside of the classroom experience.
7. Watch a movie clip from Objectified, which features the industrial designers speaking about the design process. Recap, reviewing their learning so far, which will help engrain the concepts and vocabulary.
8. Develop and design multiple Form Iterations, further visualizing and modifying the concepts, using a variety of modeling materials and drawing supplies to sketch concepts variations.
9. Conduct a Design Review. As a group, assess the work produced thus far, discussing possible revisions, as well as making opportunities to make the revisions, before proceeding.
10. Create a Final Design of the object, representing it in 2-D (drawing, labeling, dimensioning a scaled drawing) and 3-D (modeling in full scale); and finally
11. Hold a Formal Critique, during which time students reflect, document, exhibit, and demonstrate the work, explaining the utilitarian function, describing the cultural context, discussing the design process, sharing the work progression, illuminating the findings, and instructing others how to use the resulting product.

Identify Materials and Resources

What materials and resources—including student handouts, books, periodicals, media, software, URLs—are required to implement this unit?

Are the materials and resources sufficient for exploring the topic and directly related to the essential question?

Background

What is an Atlatl?

The World Atlatl Association offers the following explanation of the atlatl:

"Atlatls are ancient weapons that preceded the bow and arrow in most parts of the world and are one of humankind's first mechanical inventions. The word atlatl (pronounced at-latal or atal-atal) comes from the Nahuatl language of the Aztec, who were still using them when encountered by the Spanish in the 1500s. Other words include spear-thrower, estolica (Spanish), propulseur (French), speerschleuder (German) and woomera or miru (English versions of the most common Australian terms). An atlatl is essentially a stick with a handle on one end and a hook or socket that engages a light spear or "dart" on the other. The flipping motion of the atlatl propels a light spear much faster and farther than it could be thrown by hand alone."
Source: World Atlatl Association, http://www.worldatlatl.org/WhatisAtlatl.html

How does one pronounce it and what does it mean?

Atlatl Definition from Merriam-Webster.com

At•latl (noun)
: a device for throwing a spear or dart that consists of a rod or board with a projection (as a hook) at the rear end to hold the weapon in place until released

And here is an informative description from commercial venue, www.atlatl.com:

"When accelerated from the rear, the Arrow and the Dart flex and store spring energy. This stored energy is then used to push away from the launching platform, whether the launching platform is the spur of the Atlatl or the string of the Bow.

Figure 3: Person using an atlatl. Source: www.atlatl.com

The mass of the projectile point, on either Dart or Arrow, influences the amount and rate at which energy is stored and released. The Atlatl and Dart and the Bow and Arrow are considered to be and defined as spring mass systems. And, related both physically and mathematically in nature and deceptively complex in their interpretation, they are both true weapons systems.

However, the Atlatl and Dart is the first true and natural weapons system of the

human race, invented thousands of years before the Bow and Arrow and used longer by humans than any other weapon system yet developed. It was the Atlatl and Dart that first placed humans at the top of the food chain, ranking us above all other predators. It is, in fact, our natural ability to throw a projectile at prey that separates us from all other predators. Predators such as Lions, Tigers, and Bears run faster than humans and have sharp teeth and pointed claws, which we do not. Those are the attributes which make these predators successful. The Atlatl is the supreme expression of our natural ability to throw a projectile at a prey animal and is our advantage over all other predators, which makes us the supreme predator. And when humans used this weapon we did not take more from the environment than the environment could naturally replace itself. Thus, humans and nature, for thousands of years, were in balance with one another.

It can be argued that it was when the Bow and Arrow was developed and subsequently replaced the Atlatl that we humans began to deviate from our natural condition and take more from the environment than the environment could naturally replace itself. The Bow and Arrow was a more efficient technology for what we felt at the time to be a better life, but it in fact turned into the never-ending arms race, which continues today. For thousands of years when humans used the Atlatl we were in harmony with nature; what would our environment be like today if we had never progressed beyond that technology?"

Figure 4, Photo of youth playing lacrosse. Source: SUNY Youth Sports Institute

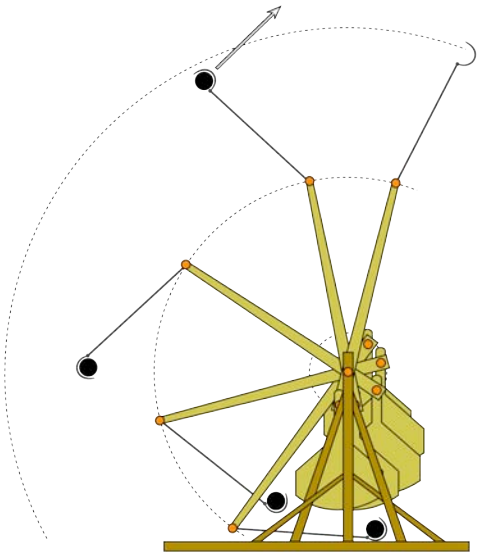

Figure 5, Tribuchet Diagram. Source: Projectile Physics, the online classroom for Mr. Hatten's Projectile Physics Class, www.mrhatten.com

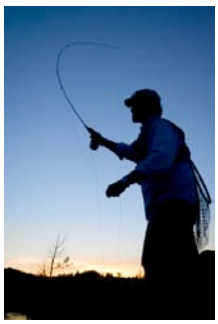

Figure 6, Fly Fishing. Source: Discovery Magazine, http://discovermagazine.com/2008/the-body/18-the-whip-like-physics-of-fly-fishing

Figure 7, Fastball Pitch. Source: http://1.bp.blogspot.com/-IZW2-E0ve6I/Ti2zdI3TpiI/AAAAAAAAC9c/CpW5onDjnYg/s1600/jennie-finch-softball-windup.jpg

Figure 8, Javelin Throw. Source: http://edshare.de/Blog/Leryn-Franco-Womens-Javelin-Throw-Qualification-Beijing-2008%20(6).jpg

• World Atlatl Association, where much information can be found regarding atlatls – http://www.worldatlatl.org/

• Local Museum Resource – Brown University's Haffenreffer Anthropology Museum Collections Research Center and Offices, has five atlatls in the collection available for viewing, and they offer the The **Culture CaraVan: Outreach Programs for School and Community Groups** brings structured group programs right to your school or site. The program includes **Free Lesson Plans**, standards-based lesson plans are available for educators to use on their own or as pre-visit activity packets for groups participating in the Culture CaraVan Program. And, educators can take advantage of **Teacher Workshops**, professional development workshops to give teachers tool to enhance their teaching of topics in social studies and history.
http://brown.edu/Facilities/Haffenreffer/

Figure 9: Culture CaraVan logo, van, and teacher workshop. Source: brown university website.

• Website – http://www.atlatl.com/

• Video – A demonstration of a tennis ball launcher, "KONG Rocket: Ball Launcher Dog Toy", http://www.youtube.com/watch?v=wuuDNXp66oM

• Video – Because it is very informative and orienting, teachers will want to see Bob Perkins explain the atlatl on the following youtube link: http://www.youtube.com/watch?v=Ej3it7Ct76w
WARNING: This video contains language that may not be appropriate for children.

• Video – Dr. Adams, atlatl master. A demonstration of a dart thrown at a model.
http://www.youtube.com/watch?v=-5fx0uh3mis&feature=related

• **Video – "Weekend Project: Atlatl Deadly Dart Shooter",** Source: Make Magazine
http://www.youtube.com/watch?v=EYas53pGGKg&NR=1&feature=fvwp
CAUTION: The language is suitable for children, but educators must consider the atlatl is in fact a deadly weapon, and therefore should take full responsibility for safety and behavior.

Make Magazine, Volume 12, http://cdn.makezine.com/make/12/MAKE12_Atlatl.pdf

• G9 Physics Unit – Investigating the Physics of the Atlatl, by Lauri Davis, Mississippi Archeology Center, http://www.uwlax.edu/mvac/PDFFiles/NEH2010Les/Atlatl.pdf

• Video – Objectified

• Northern Plains Atlatl Association, thudscave.com/npaa
• Handouts from the Northern Plains Atlatl Association
1. Atlatls from Around the World, http://thudscave.com/npaa/articles/atlatlsworld.pdf
2. Make and Take Atlatls, instructions for making inexpensive atlatls, http://thudscave.com/npaa/articles/maketake.pdf
3. Introduction to the Atlatl, http://thudscave.com/npaa/articles/introatlatl.htm
4. How Hard Does it Hit? A study of the Atlatl and Dart Ballistics, http://thudscave.com/npaa/articles/howhard_10-04.pdf
5. Using the Atlatl: The Basics, http://thudscave.com/npaa/articles/atlthrow.htm
6. Terms for the Atlatl, http://thudscave.com/npaa/articles/terms.htm
7. Peg Styles, http://thudscave.com/npaa/articles/pegs.htm
8. Atlatl Weight Attachments, http://thudscave.com/npaa/articles/weights1.htm
9. Handles, http://thudscave.com/npaa/articles/handles.htm
10. Carving Soapstone Weights, http://thudscave.com/npaa/articles/stonecarve.htm

STAGE FOUR: ALIGNMENT and REFLECTION

Do the various pieces of my Unit Plan align with and support each other?
Upon completion of my unit: How did it go? What might I do differently next time to improve the unit and my practice?

Implementation Alignment and Reflection *How do the instructional activities support the achievement of the desired outcomes?* *How do the assessment methods demonstrate achievement of the desired outcomes?* *AFTER THE UNIT IS COMPLETE:* *What worked?* *What didn't work?* *What would another teacher need to know in order to enact this curriculum?*	**Instructional Methods and Outcomes.** The workshop is organized into eleven steps, a basic design process. It is a replicable scenario for future design briefs, whether it is designing spatulas or sports equipment. (The steps are listed in this unit plan under Stage Three: Plan Learning Experiences for Instruction.) If one completes all of the steps, the unit will address key standards as listed in Stage One: Identify Desired Results, Desired Outcomes for Student Learning/Standards. Depending upon the individual teacher's interest and content area, this unit can be further adapted to address other standards. While the length of the workshop will not allow time for this type of expanded development, educators will leave the workshop with an understanding of they might continue with their own curriculum innovations both in and out of the classroom. **Assessment methods.** Assessment for this workshop will be through informal conversations, group reflection, and individual written reflection (during planning times). The focus of all three formats will be how to compare our work to the vocabulary of the standards, how to improve the project, possible extensions, teaching considerations, and advise to other teachers who might be interested in implementing this project. More in-depth assessment would occur outside this workshop – it would require additional discussion, as well as time for testing, development, revisions, documentation, and sharing. For a more in-depth assessment (for instance using rubrics or participating in a critical conversation about our work) we would need the time for conversations about our work as well as time to go back and revise which can be accomplished with more time in the classroom.