



## INSTRUCTIONAL RESOURCES FOR THE MICHIGAN DESIGN PRIZE CHALLENGE:

These resources are intended to act as a guide and not as a strict curriculum or protocol you must follow to complete the challenge. You will find them useful whether or not you are just beginning your journey teaching students how to think like a designer, or whether you have extensive experience with these practices. For those who would like a more in-depth and personal experience learning to work with these tools and ideas, we recommend you **contact us at Wholemindesign Studio For Teaching and learning** . You can also find more information at [www.wholemindesign.com](http://www.wholemindesign.com) on the “**Current Offerings**” page: Educators as Designers: the Michigan Design Prize Challenge.

Additionally, there is a downloadable set of **FAQ’s** you can find on the “Michigan

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Michigan Design Prize Application” page on the MDC website will help support your understanding of how to make the most of this opportunity.

**The information below is organized into 4 sections and is intended to be used in whatever manner and whatever order is useful to you.**

## **Explanation of the design process**

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Below you will find a fuller definition of each design phase along with ideas for engaging activities for your students within each stage. While designing is a recursive process, we recommend that you move through the stages sequentially the first time around. In some cases the ideas are presented as a menu of choices you can select from, and in other cases we recommend completing all of them for the best experience.

Before beginning the design process, we recommend reviewing the “**Context and Inspiration**” information, as well as the **application form**. Both can be found on the Michigan Design Prize/2020 Application page of the MDC site.


This three-minute video by John Spencer is a great overview of design thinking. He wrote the book, **Launch, a Design Thinking Framework for K-12 students**.  
<https://www.youtube.com/watch?v=LhQWrHQwYTk>

## STEP 1: DISCOVERY and FRAMING OF THE PROBLEM

(NGSS: Asking Questions and Defining Problems)

- Asking questions and defining problems to specify relationships between variables and clarify arguments and models.
- Define a design problem that can be solved through the development of an object, tool, process or system and included multiple criteria and constraints, including scientific knowledge that might limit possible solutions)

**Explain the purpose:** designers exploring a real world situation, challenge, or problem from a **human-centered point of view**. The goal is to find out as much as possible about the situation, the people the challenge affects, and the multiple perspectives involved in the challenge. Once you have discovered as much as you can, you choose a particular problem to solve and frame a **design statement to focus your work**.

**Discovery** is a time to “**flare**”  **your thinking** - being open to many different perspectives, feelings, and thoughts without judgment so as to allow **choices and options to emerge** later in the design process. Involves a **perspective shift**; trying to see and understand the world from someone else’s point of view. It involves **empathy, openness, curiosity, keen observation, and deep listening**. Discovery involves suspending our own points of view and focusing on others’ so you can build understanding about the users and their stories.

Resist the temptation to come up with solutions during Discovery - your only job right now is to “discover”. If you have ideas that **begin to spark, write or sketch them in your design journal and return to them later**.

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### Ideas for the discovery process

- Interview others: use the questions below to elicit others’ thoughts, impressions and feelings about exploring parks. Capture findings with phrases and quick sketches.
- You can also invite special guests into your classroom and interview them, adding their responses to your collection.

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- Take a field trip to a park and then have the children sketch or record what they noticed, enjoyed, etc.
- Create a survey of questions and send out to a broad audience.

**(For grade levels that are not yet independent enough to interview others, the teacher can conduct and record interviews with his/her students and guest to create one class set of discovery data)**

**Possible interview questions: (and these are just suggestions – you can create your own as well)**

- When you hear the word “explore”, what comes to mind?
- What kinds of “parks” have you been to (metro parks, state parks, neighborhood parks, water parks, skate parks, marine parks, etc.)?
- What did you enjoy about those experiences?
- Why do you go/why don’t you go to parks?
- What are three words that describe what it feels like to be in a Michigan park?
- What other kinds of places do you enjoy and/or like to explore?
- What kinds of struggles do you have in Michigan’s parks?

**For a field trip to observe at a park. What have you noticed about:**

- What kinds of parks are there in Michigan?
- What are people doing and saying at parks?

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- What kinds of things are in the park?
- What do you notice people struggling with at parks?

Use follow-up questions to dig a little deeper to get more information such as: What makes you say that? Can you say more about that? Do you have a personal a story about...? Does anyone one else have a connection with...?"

Encourage students to ask these questions of others in their lives, too, and add to the collective record.

**Discovery for Upper Elementary/Middle/High school** (e.g. those who can engage more independently)

Discuss the purpose of Discovery and how a designer needs to be curious and empathetic about other people's experience so as to learn as much as possible about their needs and problems before they begin to design solution. Discuss active listening and model how to ask meaningful follow-up questions in order to dig deeper into people's responses.

Students can **interview each other, people in the building, at home, and/or in their community**. They can also create **online surveys** in order to reach a wider audience.

Have students **record their observations** as well as **do research**. Capture findings with notes and sketches, screen grabs, photos, etc.

**Framing** is a time to **focus > your thinking** and make choices about the problem you want to solve with your design. **It involves interpreting the information you gathered (in the Discovery phase) in order to create a design statement.** Looking at the information you gathered from all different angles will help you create a robust and generative design statement to inspire your design. Having a well-constructed design statement is to the design process as a well-constructed thesis statement is to the writing process.

Keep avoiding the temptation to jump to a solution - this phase is *still about understanding the problem!*

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### Frame for lower elementary students:

Review the information gathered on the chart paper with the students. On another piece of chart paper, engage the students in making a list of the different problems and needs they discovered about how people explore and enjoy Michigan's parks. Facilitate as needed to elicit specifics. Ex: "What kinds of safety needs do we notice? What kinds of problems do people experience exploring parks— what is the human need? What needs and problems did you notice people have when exploring parks? The idea is to make a connection to the Discovery data.

Once you have gathered as many ideas from the students as possible. Ask the students as a group to choose three of the needs that seems most important or interesting to solve. Write a design statement about each need using the prompt:

"Our design is meant to solve the problem of \_\_\_\_\_ because \_\_\_\_\_ (this is a statement that reflects something about the people themselves)

**Examples:** (these were from the 2017 challenge of helping people enjoy Michigan's winters safely)

- Our design is meant to solve the problem of slipping on the ice, because kindergarteners are afraid of falling down and hurting themselves on the playground.
- Our design is meant to solve the problem of wanting to play on the monkey bars in the winter because they are a favorite activity, but when they are cold our mittens stick to the bars and it is hard to move.
- Our design is meant to solve the problem of wanting to play outside at winter in the dark, because a lot of kids get home from school after the sun comes down, but still want to get fresh air and run around

### Frame for Upper Elementary/Middle/High School

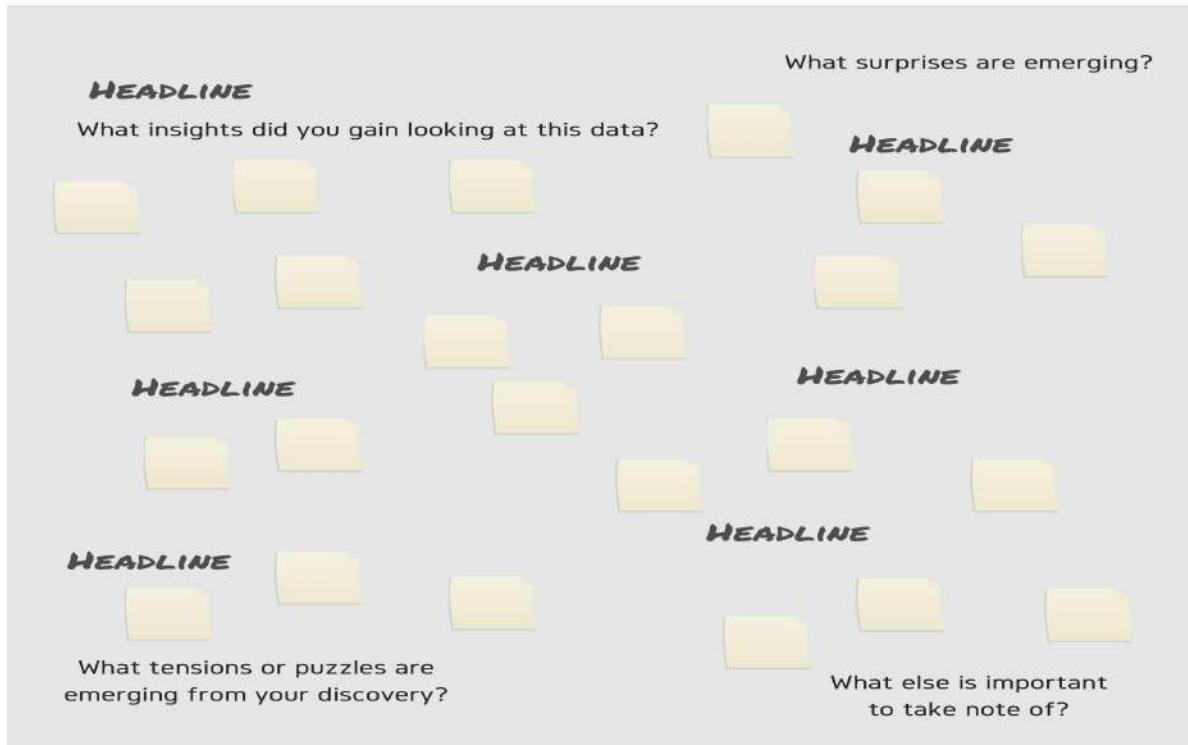
**It is recommended that you complete each of these activities in the order presented**

1. Organize your Discovery data by asking: What insights did I gain? What trends are appearing? What tensions are surfacing? What surprises did I find? What else is emerging that should be paid attention to?

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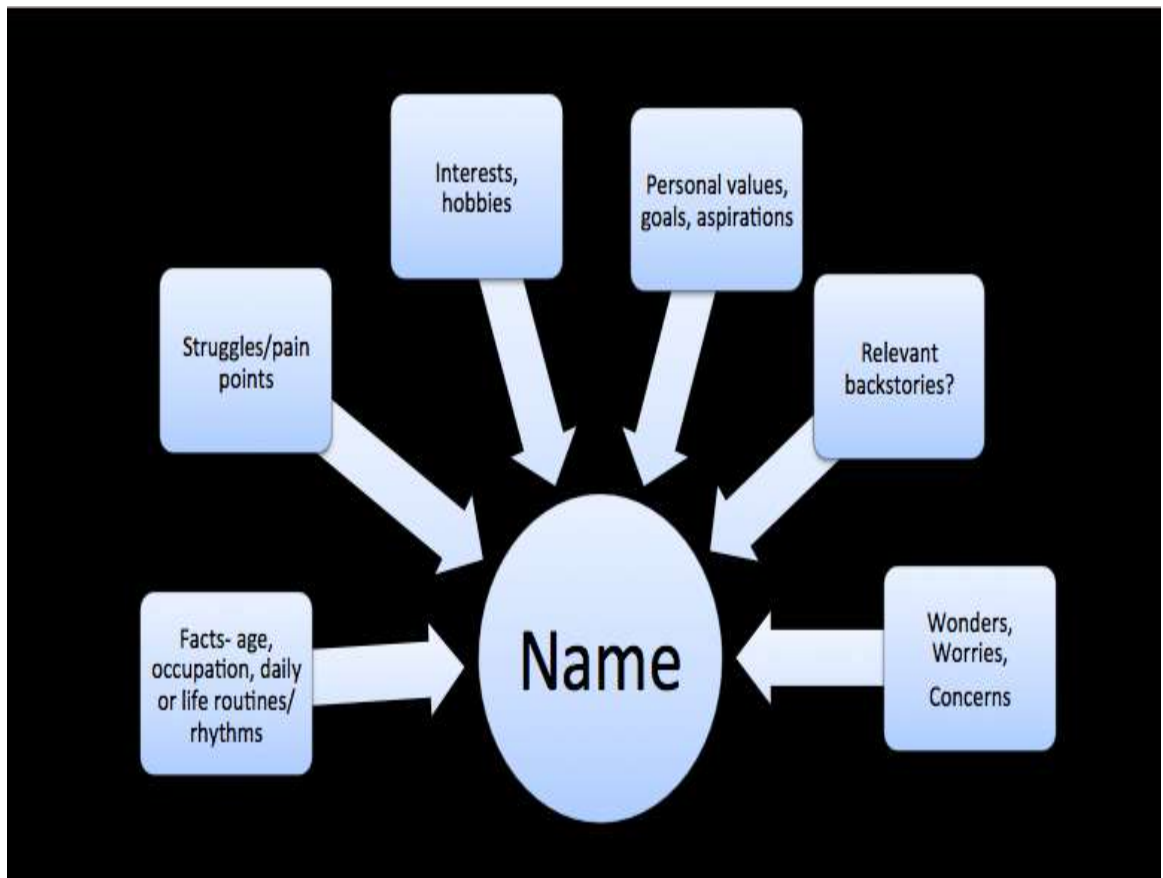
## INSTRUCTIONAL RESOURCES FOR THE MICHIGAN DESIGN PRIZE COMPETITION

2. Write headlines that capture the trends that are appearing across your Discovery data.
3. Based on the trends create a “user persona” - a created identity that defines your user. It is derived by amalgamating qualities of real people into a single composite user - things such as the “person’s” age, occupation, interests/hobbies, values, struggles/pain points, personal goals and aspirations, worries, etc. A persona helps get a human-centered solution to the challenges.



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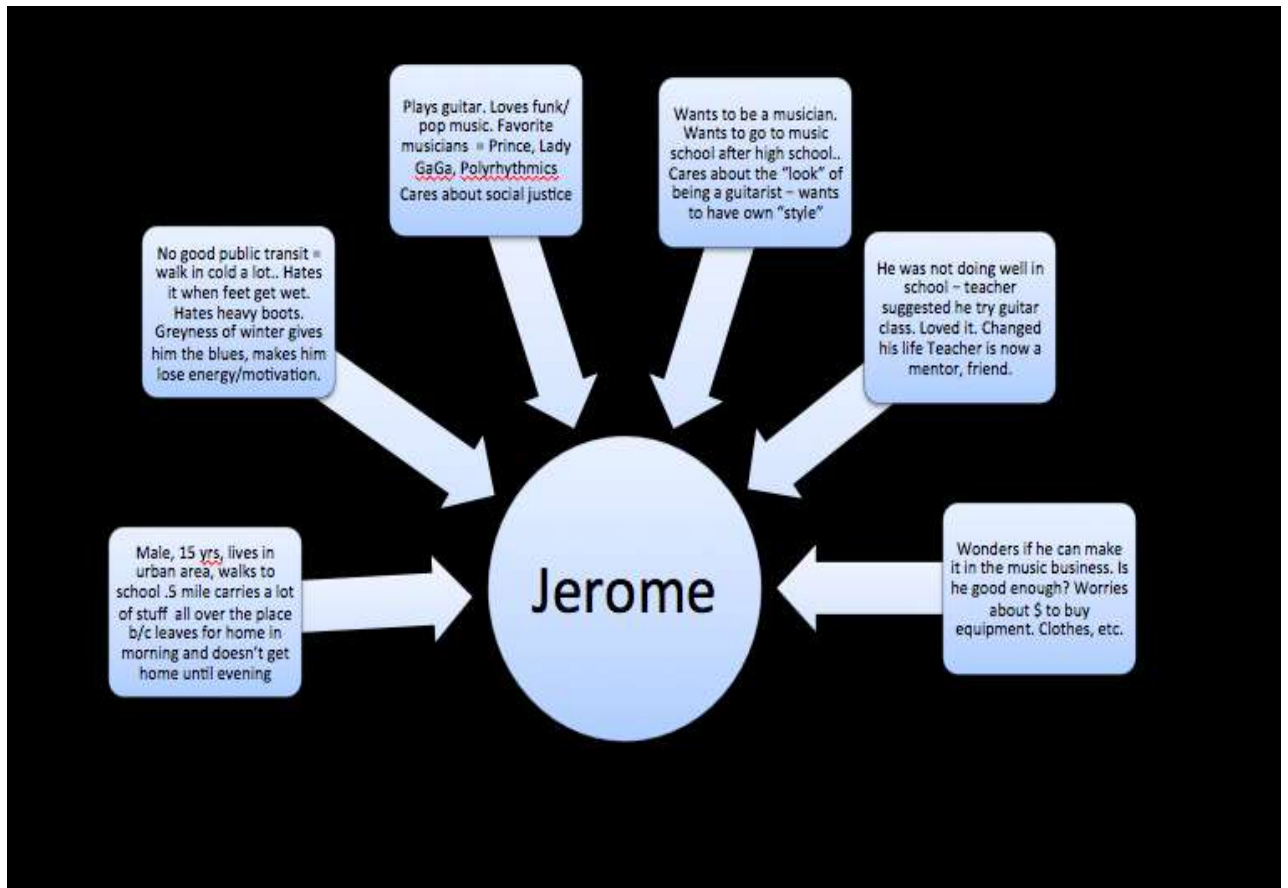
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(This is an example of a persona from the 2017 Design Prize Challenge helping people safely enjoy winter)

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- Once you have created a persona, write a **design statement** that reflects that persona: **user** + **a need** + **an insight about the “person”**.
  - User**: be specific, descriptive: use empathetic language
  - Need**: identifies a need that is meaningful and includes feelings
  - Insight**: incorporates your observations; often unexpected

Ex: **Jerome, an aspiring teenage musician, needs a way to feel more comfortable walking long distances in the cold while carrying a lot of stuff, because staying warm and having “style” are both important to him.**

(This is an example of a design statement from the 2017 Design Prize Challenge helping people safely enjoy winter.)

## STEP 2: IMAGINING AS MANY SOLUTIONS TO THE PROBLEM AS POSSIBLE

(NGSS: Developing and Using Models)

- Developing, using, and revising models to describe text, and predict more abstract phenomena and design systems.
- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.

### Developing and Using Models

**Explain the purpose:** Now you can finally start working on solutions! This phase is sometimes called **“ideation.”** Using your design statement to inspire your brainstorming, generate as **many potential ideas** as you can to meet that challenge.

Use your mind’s eye to **visualize an idea**, then use a sticky note to capture it with a **“sketch-planation”** and one or two words.



**Don't stop with the first idea** or decide on the “best” solution at this stage. Keep an **open mind and don't get**

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**attached to your ideas** - you will end up setting most of them aside. Push yourself to generate as many ideas as possible. **The goal is quantity.** This is a time to **Flare** < your thinking and feeling.

### Imagining for lower elementary students:

With younger ones it is best to do this as a group with an adult recording ideas (or in small groups if you have assistance). Begin by writing each design statement on a piece of butcher paper. Next give the children individual **think time** to come up with one or two ideas to share. Once there has been enough think time, begin asking the children to share their idea with the group while you record it. After one idea is shared, ask the others if they had the same or a similar idea so you can begin to cluster ideas together. Repeat for each of the design statements. Depending on stamina, this can be done in small chunks of time until completed. When everyone has had a chance to share, read over the ideas out loud. Ask the children if any further ideas are sparking and record them.

### Imagining for Upper Elementary/Middle/High School

- Using their individual or group's design statement, engage the students in a **BrainSWARM** by providing time for them to individually generate as many ideas as they can, **allowing for wild ideas**. This is a time to flare one's thinking and withhold judgment. The goal is quantity.
- Once each person has brainstormed, then as a group they share their ideas, sorting them into like categories as they go. Give each category a "**Headline**" - a quick label that identifies like ideas.
- Once the design team has generated and sorted their ideas, they can begin to make connections between the groups.

doing **more imagining (flaring** < ) to fill out the choices and add in more options.

- These questions are useful for pushing your ideas further: What existing idea could we use to **make it simpler**? Which of our ideas could we **combine** and what happens when we do? If we were guaranteed to be extraordinarily successful in solving this challenge, what would we **dare to imagine**? What existing solution could we redesign to make it applicable to our design challenge?

## STEP 3: PROTOTYPING AND TESTING SOLUTIONS

(NGSS: Developing and Using Models; Engaging in Argument from Evidence)

- Developing, using, and revising models to describe, text, and predict more abstract phenomena and design systems
- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.
- Constructing convincing arguments that supports or refutes claims for either explanations or solutions about the nature and designed world
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria

**Explain the purpose:** During this stage you will **“do the experiment”** by getting something tangible into your user hands to get feedback on your idea.

A **prototype is a rough and ready** representation of your idea. It can be a **sketch**, series of sketches, and/or a **3-D model** made out of inexpensive, easily obtainable materials and is made very quickly. Something to consider is a quote by Jeff Deboer, Chairman of the MDC and Vice-President and Principal of Sundberg-Ferar, “A picture speak thousand words, **a model speaks a million.**”

A prototype helps us **“fail faster to succeed sooner”** in the design process because we can get quick **feedback on our idea before we invest a lot of resources** (time and money) into the design. Don’t get attached to any idea - be willing to let it go for a better one. **You are not your ideas.**

### Prototyping and testing for lower elementary students:

This should be a highly scaffolded and modeled experience for students. We recommend using the following sentence stems such as the following:

- This part of your design is really \_\_\_\_\_(helpful, interesting, creative, unique...etc.) because\_\_\_\_\_
- I like the way you \_\_\_\_\_because\_\_\_\_\_
- Something you might try is \_\_\_\_\_because\_\_\_\_\_

Doing this with the whole class first, with the teacher modeling a few examples with a student is best, then put the children in small groups or pairs to give each other feedback.

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### Prototyping and testing for Upper Elementary/Middle/High School:

#### Share with students

- Let your user engage with the product rather than merely listen to you explain how it works. It can be helpful to set the stage for them. For example: “You are a snowmobiler who likes to go out at dusk and ride around. You want to be as visible as possible, so you are wearing this vest (you might want to explain some features of your design, but RESIST the temptation to explain why you think these features are so great). As you think about using this vest I am going to ask you a few questions to get your feedback. Please be as honest as possible, knowing that this is just the first prototype of our idea and we are going to be creating another one based on what we learn.”

#### Menu of feedback questions (you would choose a few that work best for your design)

- Identify two aspects of our work that you think are well thought out and one thing you wish we would work on more.
- Share one aspect you think we should omit from our work, one aspect you think we should keep in our work, and one aspect you think we should add to our work.
- Share what got you excited when you interacted with our prototype.
- Share what felt difficult/uncomfortable/challenging/frustrating about our design.
- Respond to the following prompts (adding in content relevant to your design).
  - When I heard...I thought of...
  - What do you think will happen when...
  - How did you feel about...

## STEP 4: EVOLVING/ITERATING

(NGSS: Engaging in Argument from Evidence)

- Constructing convincing arguments that supports or refutes claims for either explanations or solutions about the nature of the designed world
- Evaluate competing design solutions based on jointly developed and agreed-up design criteria

**Explain the purpose:** This stage of the design process is when ***you reflect on what you learned*** when you tested your prototype. Based on the feedback you were given from others and what you observed, you have to decide ***to improve your idea***.

**Use these questions to guide your analysis and reflection:** What worked? What didn't? What assumptions did people bring to the idea? What struggles occurred and why? What new ideas did you get during the prototyping and testing? What did you learn that you were not expecting? What new directions appeared that you had not thought

### Evolving/Iterating for lower elementary students:

Once the children have had a chance to give/get feedback on their design, bring them back together to discuss what they learned and what ideas are sparking for improvement. If there is time to actually make specific changes to the design, that is ideal. However, simply being aware that the design process involved iterations and changes to one's original design is also enough at this point in their learning. It is helpful to connect them to the idea that they might

need to *Flare* < their thinking again to get ideas for improvement. Keep the emphasis on the user – we evolve our ideas to better solve the problem we are working on and meet peoples' needs.

### Evolving/Iterating for Upper Elementary/Middle/High School:

Share this with students: After you have analyzed and reflected on what you learned during the testing, you should evolve your idea and “iterate” your prototype in some way as a response to the testing cycle. Iterating can take a lot of forms; depending on what you learned you might:

- Tweak your prototype by modifying, adding, or eliminating features.

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- Combine features of existing prototypes with a new idea that emerged and make a new prototype.
- Keep a few features of first prototype, but go back to the drawing board to re-conceptualize/redesign your solution

Depending on how much time you have for the design process you might do another round of prototyping/testing

evolving and iterating, or you might be done after one evolving/iterating cycle. This could be a time to **Flare**  your

thinking and feeling once again. Remember we are working on solving a problem for others, not just doing what we like or want to; design thinkers are in the business of designing to meet other peoples' needs.

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## Considerations for submitting your design

*Below are a few things to consider as you get ready to submit your design*

- The submission will be judged based on the **quality of the thinking, not the sophistication of the entry**. Entries **not need to be highly polished** or rendered. The pictures of the fully visualized ideas in the “Michigan Design Prize 2016 Finalists and Winners” section of this site were produced in collaboration with a mentor from a design firm as a further iteration of the concept; they don’t represent the submissions that participants entered. Your students’ submissions **can be very simple**.
- **When submitting the five representations** of their design, they should be images that represent as much of the design process as possible including the initial sketches, how the design evolved, etc. The judges want to see how your design thinking process evolved.
- **Review the application questions with your students ahead of writing** their responses to make sure they are clear, and to help them organize their thinking and answers. If you are working with **younger students, an adult can assist** the child with typing, framing a response, etc. However the **ideas should be coming from the children**. Be sure to **leave enough time in the process to complete this part of the submission requirement**.



## Additional resources

Below are further resources that we hope you will find useful about ***creativity, the design process, the culture of thinking that this challenge supports in your classroom, and information you can share with your colleagues and parent community*** to help them understand the value of participating in the Michigan Design Prize.

Also note in the **FAQ's** section found on the Michigan Design Prize/2017 application page of the MDC site, there is an articulation of ***long-term benefits of engaging in the design process with your students according to Wholemindesign***. Feel free to copy this information and share it with your school community or anyone else that you think would benefit from reading it.

### Science and Engineering Practices

#### Asking Questions and Defining Problems

Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1)

#### Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4)

#### Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3)

#### Engaging in Argument from Evidence



Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world.

- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2)

# INSTRUCTIONAL RESOURCES FOR THE MICHIGAN DESIGN PRIZE COMPETITION

## Essential Project Design Elements Checklist

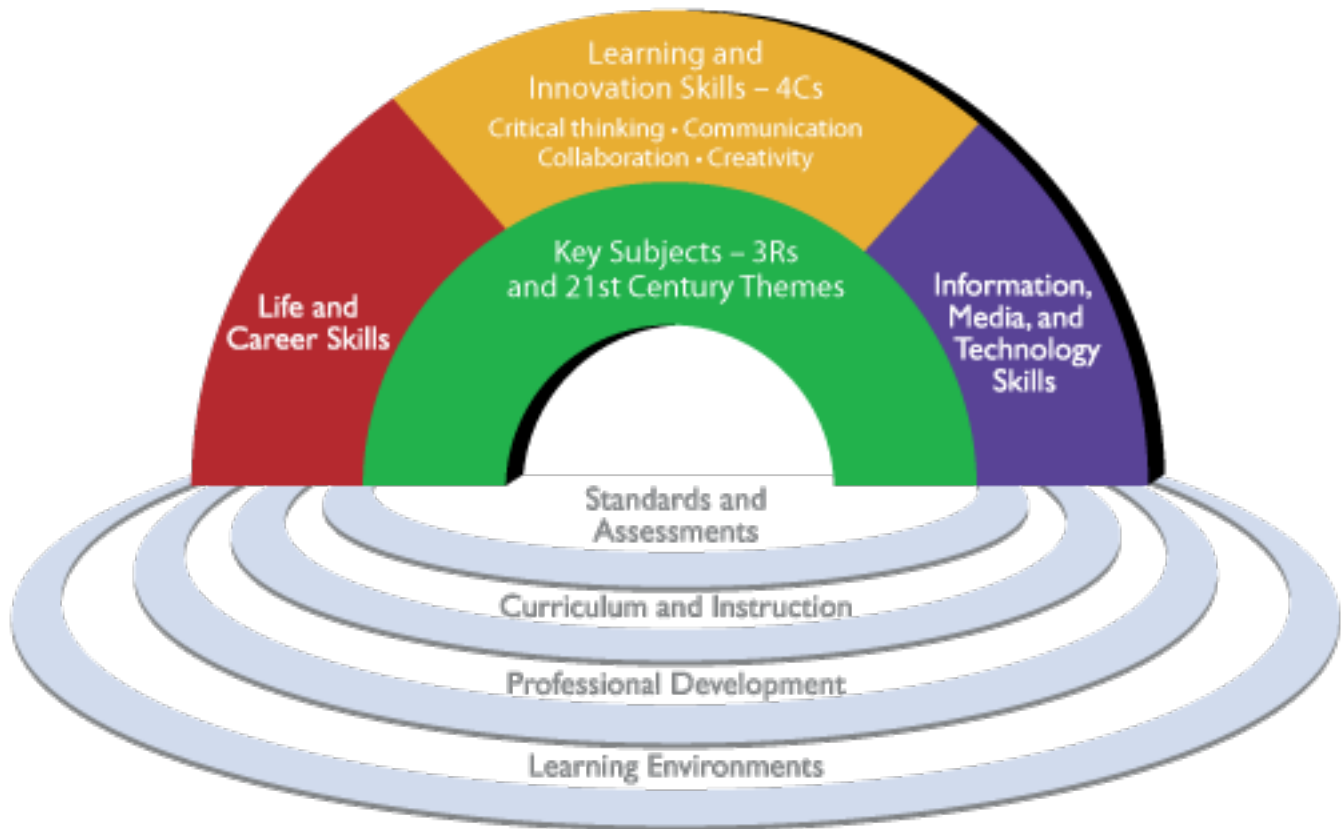
Whatever form a project takes, it must meet these criteria to be Gold Standard PBL.

Does the Project Meet These Criteria?			?
<p><b>KEY KNOWLEDGE, UNDERSTANDING, AND SUCCESS SKILLS</b> The project is focused on teaching students key knowledge and understanding derived from standards, and success skills including critical thinking/problem solving, collaboration, and self-management.</p>			
<p><b>CHALLENGING PROBLEM OR QUESTION</b> The project is based on a meaningful problem to solve or a question to answer, at the appropriate level of challenge for students, which is operationalized by an open-ended, engaging driving question.</p>			
<p><b>SUSTAINED INQUIRY</b> The project involves an active, in-depth process over time, in which students generate questions, find and use resources, ask further questions, and develop their own answers.</p>			
<p><b>AUTHENTICITY</b> The project has a real-world context, uses real-world processes, tools, and quality standards, makes a real impact, and/or is connected to students' own concerns, interests, and identities.</p>			
<p><b>STUDENT VOICE &amp; CHOICE</b> The project allows students to make some choices about the products they create, how they work, and how they use their time, guided by the teacher and depending on their age and PBL experience.</p>			
<p><b>REFLECTION</b> The project provides opportunities for students to reflect on what and how they are learning, and on the project's design and implementation.</p>			
<p><b>CRITIQUE &amp; REVISION</b> The project includes processes for students to give and receive feedback on their work, in order to revise their ideas and products or conduct further inquiry.</p>			
<p><b>PUBLIC PRODUCT</b> The project requires students to demonstrate what they learn by creating a product that is presented or offered to people beyond the classroom.</p>			



## P21 Framework for 21st Century Learning

21st Century Student Outcomes and Support Systems



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[www.P21.org/Framework](http://www.P21.org/Framework)

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### VIDEOS



***Dylan William Creativity:*** This two-minute video packs a lot of punch about the importance of creativity in schools.  
<https://www.youtube.com/watch?v=V5Beq8Si8C0>



***Do Schools Kill Creativity?*** This famous twenty minute Ted talk by Sir Ken Robinson makes a great case rethinking aspects of schooling. <https://www.youtube.com/watch?v=nyt4YvXRRGA>



***Design Thinking - Maximizing Your Students' Creative Talent.*** In this 10 minute Tedx video, Co Barry explains the power that Design Thinking can have in students' lives.  
<https://www.youtube.com/watch?v=nyt4YvXRRGA>

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## INSTRUCTIONAL RESOURCES FOR THE MICHIGAN DESIGN PRIZE COMPETITION

### BOOKS

#### For Children



**The Most Magnificent Thing**, by Ashley Spires is a delightful story for all ages about creation, problem-solving, failure and perseverance. <http://www.kidscanpress.com/products/most-magnificent-thing>

#### For teachers



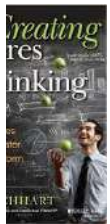
***Making Thinking Visible***, by Ron Ritchhart

Full of great resources for encouraging original thought through the use of “thinking routines”.

[WWW.Ronritchhart.com](http://WWW.Ronritchhart.com)

**Creating Cultures of Thinking**, by Ron Ritchhart

Dr. Ritchhart discusses 8 cultural forces that must be mastered to transform our schools.

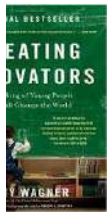


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**Innovator's Mindset**, By George Couros  
Helpful ideas for empowering students learning and creativity



**Creating Innovators** by Tony Wagner. A provocative look at why innovation is today's most essential real-world skill what young people need from parents, teachers, and employers to become the innovators of America's future.  
<http://www.tonywagner.com/>

## Connection to content standards



On the pull-down menus for “Practices” and “Crosscutting Concepts” you will see a list scientific practices, concepts and that the Michigan Design Prize directly supports.  
<http://www.nextgenscience.org/>



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In the “Creating” section of the National Arts Standards you will find information that helps you understand the connection between engineering and art that is fundamental to effective industrial design.

<http://www.nationalartsstandards.org/>



On page 12 of the C3 Framework for Social Studies State Standards is a description of the four dimensions of social science that connect to the social aspects of industrial design.

<http://www.socialstudies.org/sites/default/files/c3/C3-Framework-for-Social-Studies.pdf>



The CCSS for ELA place a big emphasis on learning to “read” visual images, along with reading and writing informational text to share their ideas. The Michigan Design Prize offers many opportunities to develop these important literacy skills in your students as they complete the required task of writing about their idea from a multitude of perspectives as part of the submission process.

<http://www.corestandards.org/ELA-Literacy/>

Similarly, the CCSS for Math defines a set of nine mathematical practices that cut across all grade levels, mastery of which help support students’ college and career readiness. Many of these practices can be developed by participating in the Michigan Design Prize challenge. <http://www.corestandards.org/Math/Practice/>.

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## Glossary of Commonly Used Design Vocabulary

### **Flaring and focusing your thinking:**

**Flare:** flaring your thinking is what you do when you want to generate a lot of ideas and create choices. It is divergent thinking, allowing your ideas to flow without editing or judgment. The goal is quantity.

**Focus:** focusing your thinking is what you do when you need to make choices and decisions regarding what direction your solution is taking. It is convergent thinking. When in focus mode you are sorting and judging ideas to decide what is worth pursuing during a particular design cycle and to define a solution pathway forward.

**Headline:** during the design thinking process one often needs to analyze and synthesize ideas. Headlines are ways to quickly label categories of your thinking that are emerging, and help identify areas that may need more flaring or more focusing in order to further your design work.

**Human-centered design:** as a designer, we start from the basis of creating designs that meet human needs vs. a product that we want to “push” into the market.

**Iterate:** to iterate means to evolve your design over time based on the feedback you have been given on your prototypes. The assumption in design thinking is that an idea must go through many feedback~iteration cycles before it is considered complete.

**Sketch-planation:** a quick sketch to capture or express a concept, thought, or idea. Think “Pictionary” style communication. This is useful during all the design stages, but especially during the imagine stage.

**S.T.E.A.M:** this refers to the interrelationship between science, technology, engineering, art, and math. When considering solutions to design challenges we are focused on both the function and the aesthetic form of our creations.

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**Persona:** a “persona” is created identity that defines your user. It is derived by amalgamating qualities of real people into a single composite user. A persona helps focus your design by being specific, and create human-centered solutions that meets your user’s needs.

**POV statement:** a point of view statement is a design statement based on the user persona you created. It is meant to frame the challenge more specifically and focus/inspire your next steps in the design process. It is typically framed as user + need + insight; \_\_\_\_\_needs a way to \_\_\_\_\_because\_\_\_\_. POV’s are to a design challenge as a thesis statement is to a paper.

**Prototype:** (esp. Rapid prototype): a prototype is a rough and ready model or representation of your idea so you can get feedback on it quickly. It is typically made out of inexpensive, easily obtainable materials and is made very quickly.

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