**Note to Facilitation Workshop Participants September 21 and 22 2017**

Section VI is part of *Taking Making into Classrooms in Challenging Contexts: A Toolkit Fostering Curiosity, Imagination and Active Learning version 3 –* available the end of September.

Here is a link to v2:

[*https://issuu.com/ubcedo/docs/toolkitccresources\_english\_issuu*](https://issuu.com/ubcedo/docs/toolkitccresources_english_issuu)

For the Facilitation Workshop, we will be focusing on Section **6.3 Experiencing a Human-Centered Design Thinking Process** - explains a *Just in Time Design Thinking Process.*

**Section VI**

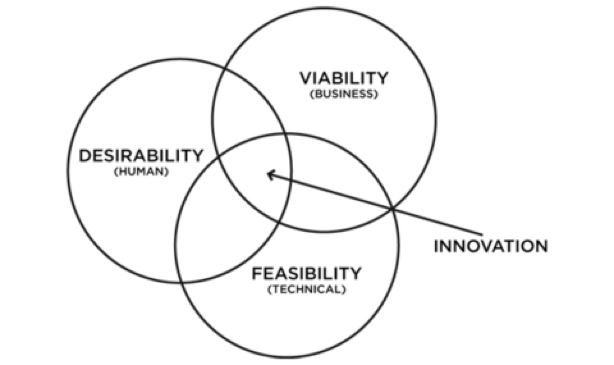
**Why We Need Our Students to be Design Thinkers**

The world of work is changing. Globalization, creation of new jobs, climate change, different ways of working amongst other factors have impacted us all. Where once there was a vibrant economy in the creation of small good and products - j*ua kali*, cheaper imported goods have replaced those products and often the need for the workers themselves. Machines and automation have taken many lower skilled jobs. These changes cause people to ask, *how do we prepare ourselves and our children for an uncertain future? What will the world of work look like for youth in challenging contexts, both rural and urban?*

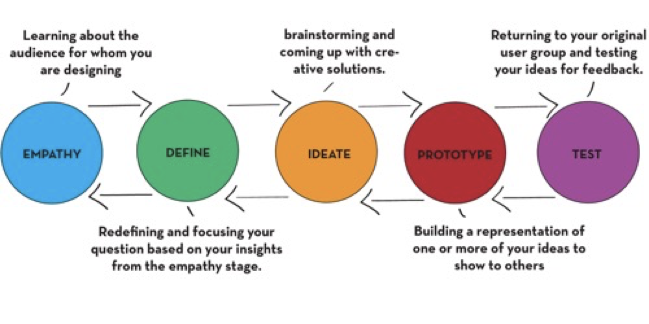
Teachers across every education system ask *How will we ensure we are educating our students to become full, proactive members of a global society with a dynamic future in which change will be a constant*? We know the ability to think well is essential and the ability to use a design thinking approach and make tangible representations of learning is important.

Design thinking is a human centred design process that seeks to gain understanding of the concerns, insights, lived experiences, and / or needs of others before developing solutions. Design thinking allows us to think beyond what currently exists. It allows us to begin to imagine what might be! It is a process typically used to wrestle with real world challenges and make meaningful changes. It starts with a consideration of how real people, in real situations will use and be impacted by the solutions we are proposing. We call this design process – human centred design.

Design thinking helps to foster innovation by considering three components of a solution: what is wanted (desirability), what is possible using existing materials and technologies (feasibility), and what is affordable (viability).



Design thinkers then move through a five step process, repeating any or all of the steps as needed. These steps are: Empathy, Define, Ideate, Prototype and Test.



**6.1 Traits of A Design Thinker**

As students engage in a human-centered design thinking process, they learn how to approach real world challenges, difficult concepts, and many perspectives by fostering the traits of a design thinker. These traits include:

* Empathy – Ability to image the world from multiple perspectives
* Integrative thinking – Ability to exploit opposing ideas and opposing constraints to create new solutions
* Optimism – Ability to assume no matter how challenging the constraints of a given problem, at least one potential solution is better than the existing alternatives
* Experimentalism – Ability to pose questions and explore constraints in creative ways that proceed in entirely new directions
* Collaboration – Ability to work together and require that complex problems require enthusiastic interdisciplinary collaboration (Tim Brown, 2008)

The initial step in a human-centered design thinking process is gaining empathy through guided conversations with others. At the heart of well-crafted, guided conversations are well-crafted questions that are open-ended, engaging and politely probing.

**6.2 Crafting Open Ended Questions – Using Bloom’s Taxonomy Question Stems**

Learning to ask good questions is one of the many important outcomes of the Design Thinking process and part of what Papert called *hard fun* for students (See Section 3.1). By introducing students to the *Revised Bloom’s Taxonomy Chart* below, teachers provide examples of process verbs, types of assessment and question stems for asking increasingly complex, higher order questions. We value the use of the revised Bloom’s Taxonomy questions as a way to introduce students into the types of questions that open conversations, engage collaboration, and encourage iteration (<https://www.cloud.edu/Assets/PDFs/assessment/revised-blooms-chart.pdf>).

| **Table: Revised Bloom’s Taxonomy** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Level of Taxonomy / Definition** | **Process Verbs** | | | | **Assessments** | | **Question Stems** |
| **Creating:**  **Complex Thinking and Questioning**  Generating new ideas, products, or ways of viewing things  Examples:  Constructing, Designing, Inventing, Planning, Producing | Act  Arrange  Assemble  Combine  Compose  Construct  Create  Design  Develop  Devise  Formulate | Generate  Improve  Infer  Invent  Imagine  Plan  Predict  Prepare  Revise  Show  Write | | | Advertisement  Blueprint  Cartoon  Collage  Film  Formula  Invention  New game  Newspaper  Painting  Plan  Play  Poem  Song  Story  Video | | Can you create new and unusual uses for…?  Can you design a…to…?  Can you see a possible solution to…?  How many ways can you…?  How would you devise your own way to…?  What would happen if…? |
| **Evaluating:**  Justifying a decision or course of action  Examples:  Checking, Critiquing, Experimenting, Hypothesizing, Judging | Argue  Assess  Choose  Compare  Conclude  Criticize  Debate  Decide  Defend | Determine  Evaluate  Justify  Prioritize  Rate  Recommend  Support  Tell why  Value | | | Conclusion  Debate  Editorial  Investigation  Judgment  Opinion  Recommendation  Report  Survey  Verdict | | Do you think…is a good or bad thing?  How effective are…?  How would you feel if…?  Is there a better solution to…?  What are the pros and cons of …?  What do you think about…? |
| **Analyzing:**  Breaking information into parts to explore understandings and relationships  Examples: Comparing, Deconstructing, Finding , Interrogating, Organizing | Calculate  Categorize  Classify  Compare  Contrast  Diagram  Differentiate  Discover  Distinguish  Examine  Experiment | Group  Interpret  Investigate  Order  Organize  Question  Relate  Research  Sequence  Solve  Survey | | | Chart  Checklist  Database  Diagram  Graph  Illustration  Investigation  List  Outline  Plan  Questionnaire  Report  Spreadsheet Summary | | Do you think…is a good or bad thing?  How effective are…?  How would you feel if…?  Is there a better solution to…?  What are the pros and cons of …?  What do you think about…? |
| **Applying:**  Using information in another familiar situation  Examples:  Carrying Out, Executing, Implementing, Using | Adapt  Apply  Calculate  Change  Compute  Demonstrate  Dramatize  Draw  Experiment  Illustrate | | List  Make  Manipulate  Practice  Produce  Sequence  Show  Solve  Teach  Use | Demonstration  Diagram  Experiment  Illustration  Journal  Map  Model  Prepare Lesson | | -Do you know of another instance where…?  -Can you group…?  -Which factors would you change…?  -What questions would you ask of…?  -From the information given, can you develop a set of instructions about…? | |
| **Understanding:**  Explaining ideas or concepts  Examples:  Classifying, Explaining, Interpreting, Paraphrasing, Summarizing | Ask  Calculate  Convert  Describe  Discuss  Explain  Give Examples  Identify  Locate | | Observe Recognize Report  Research  Retell  Review Summarize  Tell | Debate  Definition Dramatization  Example  Explanation  Label  List  Outline  Quiz  Recitation  Reproduction  Story  Set Problems  Summary  Test | | Can you write in your own words … ?  How would you explain…?  What might happen next?  What was the main idea…?  Who do you think…? | |
| **Remembering:**  Recalling information  Examples: Describing, Finding, Listing, Naming, Recognizing, Retrieving | Choose  Cite  Define  Describe  Give Example  Group  Know  Label  List  Listen  Locate | | Match Memorize Name  Quote  Recall  Recite  Record  Repeat  Select  Underline | Definition  Facts  Label  List  Quiz  Reproduction  Test  Workbook  Worksheet | | Can you name…?  How many…?  What happened after…?  What is…?  Which is true or false?  Who …? | |

**6.3 Experiencing a Human-Centered Design Thinking Process**

**Note:** Section 1, *Academic Underpinnings,* in the *Toolkit for Challenging Contexts: Taking Making into Schools (*[*https://issuu.com/ubcedo/docs/toolkit4cc\_english*](https://issuu.com/ubcedo/docs/toolkit4cc_english)*)* provides additional background regarding Making, Active Learning, and Design Thinking.

A design thinking process starts with a real world challenge. Rather than hurrying to find a quick solution or trying to immediately replicate generalized solutions, a design thinking process is used to find and identify the source of the challenge by the people experiencing it and the factors that may influence its successful implementation within a given context.

Participants engage in a design thinking process starting with a facilitated, guided conversation with colleagues, partners and possibly community members. By asking guided, open ended questions, these conversations support problem finding and problem identification before problem solving.

The following Design Challenge and Design Thinking process will help you to lead a human-centered design thinking process using the content within this Toolkit.

**Design Challenge:**

How do well-crafted resources support active learning and foster a growth and an intentional mindset? Further, how do teachers in challenging contexts locate, develop and use these types of resources in their teaching, especially in large class settings?

**Before Starting the Design Thinking Process:**

1. Make sure all participants have a partner. Partners might be individuals who teach the same subject or the same grade level.
2. Introduce participants to the design challenge. Introduce participants to the design thinking process. Explain this series of activities will be timed. Assure the participants there may be activities that seem way too long or way too short. Ask everyone to save their questions about the process until after it is completed. For now, trust the process.
3. Give each participant a piece of A4 paper, a sharpened pencil, and eraser. Ask them to fold the paper into 4 parts and number the parts 1-4. Have extra sheets of paper, pencils and if possible, a pencil sharpener available to the participants.

|  |  |
| --- | --- |
| 1. | 2. |
| 3. | 4. |

1. Ask each pair to identify who will be Participant A and who will be Participant B. Before starting, ask Participant As to raise their hands. Thank them. Then ask Participant Bs to raise their hands. Thank them. This gives you a quick way to ensure everyone heard your instructions, has made a choice, and are ready to start.

**Design Thinking Process:**

1. Instructions for Part #1: Empathy

Learning about your partner’s perspectives and knowledge

Guiding Questions: *What is the role of well-crafted resources in supporting active learning? How do resources help students develop a growth and intentional mindset?*

Participant A will have 3 minutes to listen as Participant B responds to the general questions. Participant A will record Participants B’s responses in Part #1. Remind Participants they may need to ask additional powerful, open ended questions as prompts. There are many examples of powerful questions in the toolkit.

Start timing. Once the time is over, remind Participant As to add any additional notes on their sheet in #1.

Switch roles: Participant B will have 3 minutes to listen to and question Participant A using the same general questions and any additional powerful, open-ended questions as prompts. Remind Participant Bs to record the responses on their sheets in #1.

Start timing. Once the time is over, remind Participant Bs to add any notes on their sheet in #1.

1. Instructions Part #2: Define Challenges

Learning about your partner’s experiences and contexts

Guiding Question: *What are the challenges teachers face in using active learning resources in their classrooms?*

Participant A will have 3 minutes to listen and prompt with powerful, open-ended questions as Participant B responds to the question. Participant A records Participant B’s responses in Part #2.

Start timing. Once the time is over, remind Participant As to write additional notes on their sheet in #2.

Switch roles and ask Participant B to listen and prompt with powerful, open-ended questions as Participant A responds to the question. Participant B records Participant A’s responses in Part #2.

Start timing. Once the time is over, remind Participant Bs to write additional notes on their sheet in #2.

1. Instructions for Part #3: Define Evidence

Asking your partner to describe how their past experiences and learning have informed the challenges they have described

Guiding Question: *How do you know this?*

Participant A will have 2 minutes to listen and prompt as Participant B responds to the question.

Start timing. Once the time is over, remind Participant As to write additional notes on their sheet in #3.

Switch roles and ask Participant B to listen and prompt as Participant A responds to the question. Participant B records Participant A’s responses in #3.

Start timing. Once the time is over, remind Participant Bs to write some notes on their sheet in #3.

1. Instructions for Part #4: Ideate

Asking your partner to form creative solutions to address their unique challenges

Guiding Question: *How might you or your institution address those challenges?*

Participant A will have 3 minutes to listen and prompt as Participant B responds to the question.

Start timing. Once the time is over, remind Participant As to write additional notes on their sheet in #4.

Switch roles and ask Participant B to listen and prompt as Participant A responds to the question. Participant B records Participant A’s responses in #3.

Start timing. Once the time is over, remind Participant Bs to write additional notes on their sheet in #4.

1. Instructions for Part #5: Prototype

Asking participants to work individually to create a prototype of a possible solution

Ask Participants to turn their papers over. Ask the Participants to divide their paper into half numbering one half #5 and the second half #6

|  |  |
| --- | --- |
| 5. | 6. |

Guiding Question: *After reviewing all your notes and reflecting on all the information you and your partner have created, what resource would you begin to develop to support active learning, foster a growth and intentional mindset for your students? How would your resource address at least one of the challenges you and your partner discussed?*

Before starting, review the Design Challenge. Remind participants the definition of a prototype as a representation of one or more ideas to show how you might begin to solve the design challenge.

Participants will be given 5 minutes to answer the guiding questions individually. Ask Participants to describe, using words and / or drawings, how they would begin to develop and design a quality resource that could support active learning and foster a growth and intentional mindset in your students.

Start timing.

1. Instructions for Part #6: Test

Asking another participant to be your critical friend as you describe your resource

Ask Participants to share their ideas with a Participant in the room that was not their Partner for Parts 1-4. Remind the participants to write down any additional ideas or questions their critical friend surfaces. Ensure that both participants have time to present and receive feedback. Remind everyone to have some notes in #6.

Before starting, remind Participants what it means to be a Critical Friend.

* + Ask open questions
  + Give constructive feedback
  + Offer supportive ideas
  + Use “and” rather than “but” when offering feedback

If time allows, have the original partners met to go over their solutions and feedback.

NOTE: Teachers could use this same Design Thinking process with their students. Obviously, the question prompts would change, and this process could help students to discuss their questions concerning curriculum topics or as a way to introduce a new curricular topic.

The following are two examples teachers could modify in their own classrooms.

|  |  |
| --- | --- |
| **Design Challenge #1 – Pythagoras Theorem:**  How could you use Pythagoras’s Theorem to help you in the real world of work? | **Design Challenge #2 – Writing a Really Short, Short Story:**  Using the *Sample Resource 9.8 Simple Folded Books*, ask the students to develop a short story that could be told and illustrated in only 6 pages. Tell the students their stories can only have 2 characters, 1 dramatic piece of action, and the conclusion needs to be a lesson learned from the action. |
| **Question 1**  Do you fully understand Pythagoras Theorem? What questions do you have? How do you think it could be use in a real life application? | **Question 1**  What is an action or activity that other children could learn a lesson from? For example, how do we learn that fire can burn you or bees can sting you or??? |
| **Question 2**  What challenges might you have in using Pythagoras Theorem in the example you gave in #1? | **Question 2**  Who are 2 characters that could participate in that action or activity? |
| **Question 3**  How do you know the answer you gave in #1 and #2 are correct? What evidence or experience do you have? | **Question 3**  How do you know the action or activity could take place with your characters? What evidence or experience do you have? |
| **Question 4**  How could your teacher or classmates or family help you to use Pythagoras’s Theorem in a real world example? | **Question 4**  What is the setting for the characters and the action / activity? |
| **Question 5**  Sketch or write out the actual way in which you would use Pythagoras Theorem in the example you have given. Provide details of the tools or materials you might need to use Pythagoras’s Theorem. | **Question 5**  Storyboard the 6 pages of your story. What happens on each page? Does the action or activity happen by page 3 or 4? Is the last page of the story where we learn the lesson |
| **Question 6**  What feedback did your critical friend offer you concerning your example and the example you shared in #5? | **Question 6**  What feedback did your critical friend offer you concerning your storyboard? Are you ready to start writing and illustrating your story on the paper provided |

**Teacher Examples for Design Challenge #1 – Pythagoras Theorem**

1. Two friends are meeting at the school. Friend 1 is already at the school, but Friend 2 needs to get there taking the shortest path possible. Friend 2 has two ways to go - follow the roads to the school - first heading south 3 km, then heading west 4 km. The total distance covered following the roads will be 7 km. The other way Friend 2 can get there is by cutting through some open fields and walk directly to the school. If we apply Pythagoras's theorem to calculate the distance you will get:

(3)2 + (4)2 =

9 + 16 = C2

√25 = C

5 KM = C

Cutting through some open fields and walking directly to the school will be 2 KM shorter than walking along the roads.

2. Painters use ladders to paint on high buildings and often use the help of Pythagoras Theorem to complete their work. The painter needs to determine how tall a ladder needs to be in order to safely place the base away from the wall so it won't tip over. In this case the ladder itself will be the hypotenuse. Take for example a painter who has to paint a wall which is about 5 m high. The painter has to put the base of the ladder 2 m away from the wall to ensure it won't tip. What will be the exact length of the ladder required by the painter to complete his work? You can calculate it using Pythagoras Theorem:

(5)2 + (2)2 =

25 + 4 = C2

√29 = C

5.3 m. = C

Thus, the painter will need a ladder with an exact length of 5.3 meters.