1. What is our purpose?

1a) To inquire into the following:

- **Transdisciplinary Theme:** HOW THE WORLD WORKS

- **Central Idea:** People invent to solve problems and to improve the quality of life.

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<tr>
<th>Class/grade: 4</th>
<th>Age group: 9-10</th>
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<tr>
<td>School: Wildwood</td>
<td>School code:</td>
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<tr>
<td>Title: Necessity is the Mother of Invention</td>
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<td>Teacher(s): Mathis/Wiedegreen</td>
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<td>Date: February/March 2016</td>
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<td>Proposed duration: 5 weeks</td>
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1b) Summative assessment task(s):

What are the possible ways of assessing students’ understanding of the central idea? What evidence, including student-initiated actions, will we look for?

Content: (eg. Test, quiz, presentation) Inquiry Fair Wax Museum: 1st person
Presentation: “All about Inventor” – student made rubric. Virtual Museum built entirely by students with reflections.


Product: (eg. model, poster, movie, presentation) Improving your inventor’s invention. Make your own invention to improve your inventor’s invention. Make it better. (demonstration and model)

*** Final: Students may create argument essay arguing for or against child labor. Students will use evidence from 2 Industrial Revolution Child Labor articles and 1 present day child labor article.

2. What do we want to learn?

What are the key concepts (form, function, causation, change, connection, perspective, responsibility, reflection) to be emphasized within this inquiry?

Change: Students will see how inventions evolve over time and how society changes after certain inventions have been invented (the impact on society).

Causation: Students will investigate the causes or circumstances that led to the creation of important inventions.

Connection: Students will discover the connections among inventions and improving upon them.

Reflection: Students will learn that invention and innovation is a process of design and without reflection, the process would be incomplete.

What lines of inquiry will define the scope of the inquiry into the central idea?

- Creators of life changing inventions.
- Circumstances that led to the development of important inventions
- The impact of inventions on society.

What teacher questions/provocations will drive these inquiries?

1. Why are inventions important? (causation)
2. What influences an inventor? (connection)
3. How have inventors/inventions changed communities? (change)
4. What makes a person want to invent something? (reflection)
3. How might we know what we have learned?

This column should be used in conjunction with “How best might we learn?”
What are the possible ways of assessing students’ prior knowledge and skills? What evidence will we look for?

Introduce the unit by showing a clip of Shark Tank and completing a word study on innovation.

Students will participate in discussion about what inspires people to invent something.

Students will use Inquiry Journals to formulate a list of inquiries about the unit before we start.

Students will get into groups and complete a “What I SEE, What I THINK, What I WONDER” inquiry activity about a child labor primary resource picture teacher displays.

A T-Chart will be used throughout the entire unit and displayed in the classroom to compare and contrast inventions through time.

Primary Resources Inquiry Walk activity before lesson starts.

What are the possible ways of assessing student learning in the context of the lines of inquiry? What evidence will we look for? Formative Assessments:

Teacher Checklist: Research on specific inventor and invention

Written Task: Novel Study Literacy Binder Tasks (15 points) student choice leveled.

Rubric: CCSS Argumentative essay: Child Labor argument essay. Positives and negatives of child labor, argue for or against it and produce a counterclaim. Students will use 3 articles for evidence.

Process Task/Teacher Checklist: model of invention

Teacher Checklist: Non-Fiction book reviews tic-tac-toe choice board

Written Task: ReadWorks articles

Written Task: Primary Resources activities from Industrial Revolution box/kit.

Teacher Checklist: Transdisciplinary Skills

4. How best might we learn?

What are the learning experiences suggested by the teacher and/or students to encourage the students to engage with the inquiries and address the driving questions?

Front-loading: Students will explore the classroom PYP library on inventors, inventions, innovation and the Industrial Revolution. Students will view and research various websites using the laptops.

Learning Activities:

1. “Inventions of the 19th Century” chart – fill out throughout unit

2. Close Reads: Informational Texts from Industrial Revolution Binder
   - “What Sparked the IR. (pg EA3)
   - “The Assembly Line” (pg EA34)
   - “Labor Unions” (pg EA48)
   - “Child Labor” (pg EA51)

3. Close Reads/Social Studies Lessons from Primary Sources Kit and ReadWorks
   - “Teacher and Inventor” (pg 22)
   - “Rise of Unions and the Right to Strike” (pg 26)
   - “Child Workers in Factories and Mines” (pg 28)
   - “Building Affordable Cars” (pg 30)
   - “Two Steamboat Inventors” (pg 32)
   - “Establishing a West Route” (pg 36)
   - “Samuel Morse” (pg 40)
   - “Learning to Fly” (pg 52)
   - “Child Labor Laws” (pg 56)
   - “Patents for Inventions” (pg 60)
   - “ReadWorks.org close reads (Nobel, Westward Expansion, Women of the IR, etc)

4. Field trip to the Museum of Science and Industry

5. Student created Child Labor poetry and songs

6. Inventors DVD series. Mini-lessons are note-taking and close reads on each DVD with reflections and inquiries.

7. Comprehension Toolkit: Child Labor Laws

What opportunities will occur for transdisciplinary skills development and for the development of the attributes of the learner profile? RESEACH SKILLS:

- Formulating Questions: text dependent questions during close reads. Range of Questions
- Planning: student created rubrics and projects
- Collecting Data: taking notes and collecting evidence with proper citation
- Organizing Data: annotation of text during close reads
- Recording Data: Close reading, note taking for research
- Presenting Findings: inventor cards, written summaries from close reads, models, reflections, close question essays, and debates.
5. What resources need to be gathered?
What people, places, audio-visual materials, related literature, music, art, computer software, etc, will be available?

1. Shark Tank episodes on ABC or Hulu
8. Big Universe Books assigned: Inventors and Inventions, The Industrial Revolution, Alfred Nobel, Ben Franklin, Thomas Edison
9. Achieve 3000 articles/lessons assigned
12. Amazing Kid Inventions – Ellen Show
13. Age Of Invention DVD

How will the classroom environment, local environment, and/or the community be used to facilitate the inquiry?

1. Resources were displayed around the room. Books/inventions or student created inventions in PYP library
2. Student made Inventor Cards displayed around the room.
3. Student created art samples of the invention of writing displayed around the room.
4. Primary resources pictures and maps displayed around the room.
6. To what extent did we achieve our purpose?

Assess the outcome of the inquiry by providing evidence of students’ understanding of the central idea. The reflections of all teachers involved in the planning and teaching of the inquiry should be included.

During this unit, the students had a lot of fun and learning at the same time. From the very beginning, the students were very engaged because the thought of inventing something with that creative spark interests them (curiosity). Some of the most meaningful activities were the inventor cards. The students became invested in researching the work of their inventor and dedicated themselves to explaining how their inventor’s invention function and benefited society. Another relevant activity was studying child labor. Right away students felt like they could empathize with the child workers we read about during the Industrial Revolution. They were shocked to see pictures of the working conditions and read excerpts from real child workers. Furthermore, they couldn’t believe that child labor was still present today. When they wrote their argument essays, they used three separate articles to pull evidence from to support their claim.

Finally, probably the best activity of the unit was creating their own invention and having a Shark Tank. The students went through each of the stages of the design cycle and provided evidence of that particular stage (the entire process). Their invention all connected to the unit’s theme and central idea. Next time I teach this unit, I want the students to make their inventions actually work, and not just give prototypes of unrealistic inventions.

How you could improve on the assessment task(s) so that you would have a more accurate picture of each student’s understanding of the central idea.

Next time, I actually want to have students make their own working invention. I think it is very important to the central idea because then they will realize that inventions really can improve the quality of life. Also, I wanted the students to focus more on selling their invention by pitching their audience using the language of the unit, such as, how the world works, improving the quality of life, solves problems, etc.

What was the evidence that connections were made between the central idea and the transdisciplinary theme?

Students were able to make the connection between the central idea and the theme through the activities of the unit, but mostly when they were finally given the chance to make their own invention that would improve the quality of life and/or fill a need. Also, they understood that these inventions and the ones they created make the world actually work properly and without them, it wouldn’t be the same.

7. To what extent did we include the elements of the PYP?

What were the learning experiences that enabled students to:

- develop an understanding of the concepts identified in “What do we want to learn?”

  Change: Students learned how inventions evolved over time and how society changes after certain inventions have been invented (the impact on society). They studied their inventor’s life and the impact their inventor had on the community. Furthermore, they investigated how society changed before industrialization by creating a T-Chart.

  Causation: Students investigated the causes or circumstances that led to the creation of important inventions by researching and sharing the stories of their inventors. Also, we read a book in class as a read aloud called Mistakes that Worked.

  Connection: Students discovered the connections among inventions and improving upon them by taking their invention that their inventor was famous for and thinking of creative ways to improve the invention. This was done with the inventor card activity.

  Reflection: Students learned that invention and innovation is a process of design and without reflection, the process would be incomplete. They learned this by creating their own inventions, reflecting on them, and then trying to make them better before their Shark Tank “appearance”.

- demonstrate the learning and application of particular transdisciplinary skills?

  RESEARCH SKILLS:
  - Formulating Questions: Students came up with a list of questions about the central idea and their inventors.
  - Planning: student created rubrics and projects, such as, the inventor cards and the Shark Tank
  - Collecting Data: taking notes and collecting evidence with proper citation for the inventor research and the child labor argument essay.
  - Organizing Data: annotation of text during close reads, especially for their child labor article and inventor card.
  - Recording Data: Close reading, note taking for research on the inventor card
  - Presenting Findings: inventor cards, Shark Tank, written summaries from close reads, models, reflections, close question essays, and debates.

- develop particular attributes of the learner profile and/or attitudes?

  Inquirers: Students inquired throughout the unit about how inventions were created, how they worked and how they solved problems or made life easier.

  Thinkers: Students thought of innovative inventions that have not been created yet.

  Curiosity: Students were curious about child labor issues in present day and in the United States.

  Creativity: Students used creativity to design their own inventions that have not been created.
8. **What student-initiated inquiries arose from the learning?**

Record a range of student-initiated inquiries and student questions and highlight any that were incorporated into the teaching and learning.

1. How do inventors get the idea? How do they know no one already had that idea?
2. What if someone steals your invention?
3. Why did families want their children to work during the Industrial Revolution? Didn’t they care about them?

*At this point teachers should go back to box 2 “What do we want to learn?” and highlight the teacher questions/provocations that were most effective in driving the inquiries.*

The provocation “What impact do inventions have on society?” related to the concept “change” was the most effective in driving the inquiries. This was the most effective provocation because the students were able to understand that society has not always been the same and it is because of life changing inventions that it has changed over time. During the inquiry, students made a couple of t-charts to compare society before and after industrialization and what life was like before their inventor made their invention and life after it was made. In addition, the students compared the positives and negatives of concepts seen as more negative, but were challenged and open minded enough to see the other sides of the issues. For example, students initially viewed industrialization as positive, but didn’t think of the negative effects of it, until the activity and the collaborative conversations we had. Similarly, the students thought that child labor was much more negative and positives could not even be thought of. After an article we read called “Hard at Work”, they realized that some families have no choice but to have their kids work in order to survive - it is a last resort, otherwise the family would starve. Also, the students learned that children who work learn responsibility and life/job skills.

9. **Teacher notes:**

Next time, I want the kids to make inventions that actually work, and not just prototypes. In order for that to happen, I have to start earlier and not wait towards the end of the unit.

Again, we were not able to take the field trip to the Science and Industry Museum. I think this is important because the kids would get a better picture of industry and the way the world works. This field trip should be planned before the unit starts and taken early to help build background.

I was really happy with the list of inventors this year because there were more females and it seemed like all of the students were able to find resources. Keeper!

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**What student-initiated actions arose from the learning?** Record student-initiated actions taken by individuals or groups showing their ability to reflect, to choose and to act.

A couple of the boys in the class took it upon themselves to continue the series (show) I had them view
in class called American Genius on Netflix. We only had time to watch one of the episodes, but these boys went home and watched them all and told the class about them and what they learned.

During a movement break that I created called “Invent” the students were given 5 random objects to invent something in 15 minutes. Once that was over, there was a certain student who took it home and told me that they were going to continue making it better and actually try to make it work. The student came back the next week with the invention.