Critical Problem and Design Solution Research Project

Name:_____ **Date:** _____

Research question: **How was design thinking used to solve a critical problem**?

In this module, you have been learning about William and how he worked to solve some of the critical problems he faced in Malawi using design thinking. Discover the work of another innovator using the given research question.

Write a problem-solution essay explaining your research. Start with a TED Talk, then add to your understanding of the problem and solution by finding a relevant text source, such as an article or a website.

Your teacher will guide you through each of these steps to help you complete this project:

1. Explore the list of innovator options. Choose an innovator whose work most interests you. The list appears on next page.
2. Gather relevant information from the provided source about your subject. These guiding questions, which are reflected in the Design Solution note-catcher, will help focus your research.
   - Who is working to solve this problem?
   - What was the problem and why was it a critical problem?
   - What was the solution to this problem?
   - What phases of design thinking were used to solve this critical problem?
   - What is the impact of the solution?
   - What habits of character were evident in this problem-solution design process?
3. Plan and conduct a search for additional possible sources.
4. Assess the reliability and credibility of possible sources. Choose a reliable and credible source that contains additional information about your chosen innovator and the design solution he/she created.
5. Gather and record relevant information about your subject from the new source on the Design Solution note-catcher.
6. Practice responsible paraphrasing and quoting as you gather information on the note-catcher.

Innovator Options

Directions: To view the videos, go to TED.com. Using the search bar, type in the title of the talk or the name of the presenter. Make sure the video you are watching matches both the name of the presenter and the title listed below. Consider turning on the subtitles or following along on the transcript to aid comprehension as you listen.

Jack Andraka: "A Promising Test for Pancreatic Cancer . . . from a Teenager"

Pancreatic cancer is diagnosed often but rarely in time to save the patient. When Jack Andraka realized, after endless online research, that the test to detect pancreatic cancer hadn't been updated in 60 years, he created a new one that is as simple as dipping a piece of paper in water.

Christian Benimana: "The Next Generation of African Architects and Designers"

Christian Benimana believes that the people best suited to design solutions for uniquely African problems are the Africans themselves. As an architect with MASS Design Group, Benimana and his team of designers from Africa use architecture to promote justice and human dignity for their fellow countrymen.

Natsai Audrey Chieza: "Fashion Has a Pollution Problem—Can Biology Fix It?"

Fashion designer Natsai Audrey Chieza looked to an unusual source for her design inspiration—bacteria. She discovered that not only could certain bacteria create incredibly vibrant colors, they could be used in ways that reduce water waste typical when dying fabrics.

Ashton Cofer: "A Plan to Recycle the Unrecyclable"

Styrofoam is a one-time use product, after which it ends up in landfills and oceans, where it takes over 500 years to degrade. Ashton Cofer made this problem the focus of his science fair project, and after many failures, managed not only to break down Styrofoam but turn it into activated carbon which can be used to purify water.

Andras Forgacs: "Leather and Meat without Killing Animals"

What if we could eat meat without needing to raise and slaughter animals? Andras Forgacs shares his experiments with biofabrication, or the process of using cells to grow biological products like tissues and organs.

Saul Griffith: "High-Altitude Wind Energy from Kites"

What if a common outdoor toy could be used to harness wind power and create enormous amounts of electricity? Saul Griffith and his company Makani Power address the energy problem and the climate crisis by building giant kite turbines.

Lauren Hodge, Shree Bose, and Naomi Shah: "Award-Winning Teenage Science in Action"

In a collection of TED Talks, the three grand prize winners of the Google Science Fair share their extraordinary research. Lauren Hodge (age 13) tackles the hidden dangers of seemingly healthy grilled chicken. Shree Bose (age 15) explores why some patients develop a resistance to chemotherapy drugs. Finally, Naomi Shah offers natural solutions to reduce incidences of asthma without the need for steroids and inhalers.

Soyapi Mumba: "Medical Tech Designed to Meet Africa's Needs"

In sub-Saharan Africa where Soyapi Mumba lives, power outages and slow internet connections make it difficult to quickly and effectively treat the many patients in their understaffed hospitals. Mumba used his knowledge as a software engineer to design a solution crafted specifically to meet the challenges of his local community.

Danit Peleg: "Forget Shopping. Soon You'll Download Your New Clothes."

Fashion designer Danit Peleg believes that all humans deserve clothing that fits well, matches their body type, holds up through wear and tear, and is easily accessible. That's why she has experimented with using 3D printers and strong, flexible filaments to print her own clothes from home—and she believes you should too!

Erik Schlangen: "A 'Self-Healing' Asphalt"

Paved roads are necessary for transportation but are easily damaged and expensive to repair. Erik Schlangen proposes porous asphalt which reduces flooding, mutes road noise, and can easily be repaired to double the surface life of our roads.

Kenneth Shinozuka: "My Simple Invention, Designed to Keep My Grandfather Safe"

Every 67 seconds, someone in the United States is diagnosed with Alzheimer's, a condition that leads to confusion and impaired mental processes. Concerned for the safety of his grandfather diagnosed with Alzheimer's, teen innovator Kenneth Shinozuka invented a sensor that could be placed in a sock to alert a caregiver if the patient began to wander.

Amy Smith: "Simple Designs to Save a Life"

The number one cause of death in children under five is respiratory infections caused from indoor cooking fires. With a group of engineering students from MIT, Amy Smith developed a way to use waste products to create clean-burning charcoal.

Richard Turere: "My Invention That Made Peace with the Lions"

In Kenya, cattle are critical to the livelihood of families like Richard Turere's. Losing even a single cow to a lion attack is devastating. Through trial and error, Turere eventually designed a solar-powered solution that protects both his cattle and the lions.

Viewer warning: This video shows images of dead animals.

Chris Urmson: "How a Driverless Car Sees the Road"

Unskilled drivers and inefficient roadways lead to 1.2 million car accidents each year and 6 billion minutes wasted sitting in traffic. Google engineer Chris Urmson explains the technology being developed to create self-driving cars that can navigate roads in the safest and most efficient way possible.

Raymond Wang: "How Germs Travel on Planes—and How We Can Stop Them"

Airplanes may be convenient travel options for humans, but their tight quarters and poor airflow make traveling convenient for viruses as well. Seventeen-year-old Raymond Wong describes his process to map the flow of air inside airplane cabins and design a circulation system that more effectively filters viruses to keep passengers healthy.