Title:
Class 4: Two Million Years of Technological Advancement

Topics (CHAPTERS – Video lectures):
Chapter 1 Video. Types of technology
Chapter 2 Video. Technological change
Chapter 3 Video. Innovation through all seven ages
Chapter 4 Video. Empire: Infrastructure
Chapter 5 Video. Ocean Age and Industrialization
Chapter 6 Video. Digital Age

Subject/Course: Civics, History, Geography, Religion, Ethics, Social Studies
Grade: Secondary School Level

The Ages of Globalization book reference chapters: Chapter 1. Seven Ages of Globalization
Download your free copy here.

Timeline:
https://docs.google.com/spreadsheets/d/1tW8CGeWqgNLMda6sl99KLaNoI4Xaryz2WbWKaHHsQi U/
edit#gid=1088092373

Stage 1 – Desired Results

In this section, you will find a detailed framework that outlines the overall learning goals, the enduring understandings, attitudes and values students will develop, essential questions students should be able to formulate and/or to provoke deep thinking and discussion, and specific learning outcomes that emphasize both knowledge and skills.

Established Goals:

Summary/Overarching:

Learners will identify the key innovations in each age and the implications and consequences of the innovations in influencing the course of human history and where we are as a society today.

Enduring Understandings:

Students will understand...

- The critical role of technology in advancing society and its implications on the development of the ages of globalization.

- That technology is not a standalone element - its uptake and spread is influenced by various features of the physical world, such as geography, climate and topography.

Essential Questions:

- What are technological innovations and advancements that have changed the course of history?

- How have technological advancements impacted human growth, institutions, power, and politics?

- What innovations are currently in place that have

consequences for our future?

Students will know...

◣ The key technologies in each era that impacted the development of societies over time.

◣ The ways in which technology spreads.

◣ Governance or policy interventions that could

◣ be potentially transformative for society (technological breakthroughs, alternative economic models, interventions for political accountability, legal system accountability of culpable actors).

◣ How to investigate technological innovations in each type of non-renewable energies, showing how general mechanisms of technology help improve performance.

◣ That technological innovations are important for combating climate change and facilitating the post-carbon transition (for example, new technologies that improve the efficiency of solar panels).

◣ Financial innovations could provide useful adaptation and mitigation tools for combating climate change (for example, carbon offset markets, green bonds, and weather derivatives).

Students will be able to...

◣ Engage with family, youth groups and other organizations to reduce carbon footprints and find potential ways to increase carbon capture naturally or through new technologies.

◣ Direct their knowledge, skills, technologies, and economic activities toward supporting marginalized populations to better mitigate against and/or adapt to the climate crisis.

◣ Identify existing and potential technological innovations in renewable energy sources in use in their community or country.

Stage 2 – Assessment Evidence

In this section, you'll find key concepts and definitions essential for understanding the course material as well as activities, such as Vocabulary Flashcards, Check-Your-Facts and Fill-in-the-Blank to enhance your students' comprehension and retention. You can adapt these activities to suit various subjects and grade levels.

Concepts & Definitions

Familiarize yourself with the provided terms such as "Homo habilis," "Innovation," "Diffusion," and others. Understanding these definitions will help you effectively teach the material and connect it to your lessons.

Vocabulary Activity

Create physical flashcards for each term. This hands-on approach helps reinforce terminology and aids in building a solid foundation of knowledge. Encourage students to use these flashcards for review and practice.

◣ **Homo habilis:** is the homo genus with ability. It was a tool making hominin that is essentially an ancestor of modern Homo sapiens.

◣ **Prometheus:** is one of the Titans in Greek religion, the supreme trickster, and a god of fire. His intellectual side was emphasized by the apparent meaning of his name, Forethinker. In common belief he developed into a master craftsman, and in this connection he was associated with fire and the creation of mortals (Britannica).

◣ **Adam Smith** (baptized June 5, 1723, Kirkcaldy, Fife, Scotland—died July 17, 1790, Edinburgh): is a Scottish social philosopher and political economist, instrumental in the rise of classical liberalism. Adam Smith is a towering figure in the history of economic thought. Known primarily for a single work – An Inquiry into the Nature and Causes of the Wealth of Nations (1776), the first comprehensive system of political economy – he is more properly regarded as a social philosopher whose economic writings constitute only the capstone to an overarching view of political and social evolution. If his masterwork is viewed in relation to his earlier lectures on moral philosophy and government, as well as to allusions in The Theory

of Moral Sentiments (1759) to a work he hoped to write on "the general principles of law and government, and of the different revolutions they have undergone in the different ages and periods of society," then The Wealth of Nations may be seen not merely as a treatise on economics but also as a partial exposition of a much larger scheme of historical evolution (Britannica).

- **Alloy:** metallic substance composed of two or more elements, as either a compound or a solution. The components of alloys are metals, though carbon, a nonmetal, is an essential constituent of steel. Alloys are usually produced by melting the mixture of ingredients. The value of alloys was discovered in very ancient times; brass (copper and zinc) and bronze (copper and tin) were especially important (Britannica).

- **Diffusion:** The diffusion of innovations is a model that explains how new products, practices, or ideas are adopted by members of a social system. This theory was developed in the first half of the 20th century and gained widespread recognition through American sociologist Everett M. Rogers, who popularized it in his 1962 book Diffusion of Innovations (Britannica).

- **Innovation:** is the creation of a new way of doing something, whether the enterprise is concrete (e.g., the development of a new product) or abstract (e.g., the development of a new philosophy or theoretical approach to a problem). Innovation plays a key role in the development of sustainable methods of both production and living because in both cases it may be necessary to create alternatives to conventional ways of doing things that were developed before environmental consideration was central to most people's framework for making decisions (Britannica).

- **Bronze Age:** marked the first time humans started to work with metal. Bronze tools and weapons soon replaced earlier stone versions. Ancient Sumerians in the Middle East may have been the first people to enter the Bronze Age. Humans made many tech nological advances during the Bronze Age, including the first writing systems and the invention of the wheel. In the Middle East and parts of Asia, the Bronze Age lasted from roughly 3300 to 1200 B.C., ending with the near-simultaneous collapse of several prominent Bronze Age civilizations (History Channel).

- **Hieroglyphics:** Hieroglyphic writing is a system that employs characters in the form of pictures. Those individual signs, called hieroglyphs, may be read either as pictures, as symbols for objects, or as symbols for sounds. The name hieroglyphic (from the Greek word for "sacred carving") is first encountered in the writings of Diodorus Siculus (1st century BCE). Earlier, other Greeks had spoken of sacred signs when referring to Egyptian writing. Among the Egyptian scripts, the Greeks labeled as hieroglyphic the script that they found on temple walls and public monuments, in which the characters were pictures sculpted in stone. The Greeks distinguished this script from two other forms of Egyptian writing that were written with ink on papyrus or on other smooth surfaces. These were known as the hieratic, which was still employed during the time of the ancient Greeks for religious texts, and the demotic, the cursive script used for ordinary documents (Britannica).

- **Artificial Intelligence (AI):** is generally thought to refer to "machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgment and intention" (Shubhendu and Vijay as cited in The Brookings Institution).

- **James Watt:** is a Scottish instrument maker and inventor whose steam engine contributed substantially to the Industrial Revolution. Watt was also known for patenting the double-acting engine and an early steam locomotive. He was elected fellow of the Royal Society of London in 1785 (Britannica).

- **Henry the Navigator:** For good and for ill, Henry the Navigator helped set the stage for the modern world. Besides finding new trade routes and connecting various peoples, Henry's expeditions began the process of European colonization and the transatlantic slave trade (History Channel).

- **Issac Newton:** is best known for his theory about the law of gravity, but his "Principia Mathematica" (1686) with its three laws of motion greatly influenced the Enlightenment in Europe. Born in 1643 in Woolsthorpe, England, Sir Isaac Newton began developing his theories on light, calculus and celestial mechanics while on break from Cambridge University. Years of research culminated with the 1687 publication of "Principia," a landmark work that established the universal laws of motion and gravity. Newton's second major book, "Opticks," detailed his

experiments to determine the properties of light. Also a student of Biblical history and alchemy, the famed scientist served as president of the Royal Society of London and master of England's Royal Mint until his death in 1727.

▰ **Michael Faraday** (born September 22, 1791, Newington, Surrey, England—died August 25, 1867, Hampton Court, Surrey): is an English physicist and chemist whose many experiments contributed greatly to the understanding of electromagnetism (Britannica).

▰ **John von Neumann:** is a Hungarian-born American mathematician. Von Neumann grew from child prodigy to one of the world's foremost mathematicians by his mid-twenties. Important work in set theory inaugurated a career that touched nearly every major branch of mathematics. Von Neumann's gift for applied mathematics took his work in directions that influenced quantum theory, automata theory, economics, and defense planning. Von Neumann pioneered game theory and, along with Alan Turing and Claude Shannon, was one of the conceptual inventors of the stored-program digital computer (Britannica).

Check-Your-Facts / Review Questions

Utilize this activity to promote critical thinking by having students verify and analyze information related to the concepts and definitions.

1. **What are some of the innovations that have shaped history and our current world?** (transformation of agricultural and mineral primary commodities into useful tools, manufacturing, steam engine, digital technology using data and information systems including Artificial Intelligence, military technology, banking payment systems).

2. **How has fire played a fundamental role in human life, survival, and thriving?** (It has been essential for cooking, which improved the quality and variety of food consumed, and foragers used it to attract prey and aid in hunting. Fire also provided protection against predators, offered light and warmth, and was crucial in strengthening tools, eventually leading to the development of metalworking).

3. **What key innovations define each historical age and contributed to the rise of civilizations and nations?** (For instance, in the Paleolithic era, fire was harnessed for multiple purposes; during the Neolithic age, permanent settlements and agricultural advancements emerged. The Equestrian age saw the domestication of animals, while the Bronze Age (including the Equestrian and Classical ages) introduced the creation of alloys. The Ocean Age was marked by oceanic navigation and exploration, the Industrial Age by the steam engine, mechanization, and electromagnetism, and the Digital Age by the advent of digital technology).

4. **What are the 2 different ways that technology changes society?** (1. Innovation that devises new approaches, new tools and new ideas; 2. Diffusion: the spread of innovation, e.g. via migration or copying).

5. **Why is the writing system important for the spread of technology?** (For any technology to spread and to be used, shared and diffused, the writing system is a means in which the knowledge and information can be transmitted, such as books over vast distances).

6. **What transition happened in the oceanic navigation of the 1400-1500s?** (China retreated from ocean exploration in the 1400s and Portugal stepped into active exploration in the 1500s).

7. **What technological advancements enabled the new digital age of globalization?** (The development of the transistor was a key breakthrough, as it empowered computation and mass storage of information. This led to the creation of integrated circuits, where large numbers of transistors were placed on a silicon chip. These advancements significantly enhanced computational power, increased the density of transistors on circuits, and improved the speed at which information could be processed, stored, and transmitted—all critical elements that underpin the digital age of globalization).

Fill-In-The-Blank

Incorporate this activity to assess students' understanding of key concepts and historical periods. Provide a word bank to support their learning and check their grasp of the material.

Class 4

TWO MILLION YEARS OF TECHNOLOGICAL ADVANCEMENT

1. When we explore the transformation of each age of globalization into the next age, it is usually **(technology)**, new tools, new science, and **(engineering capacities)** that push humanity into a new era.

2. Our early ancestor was named by scientists, **(Homo habilis)**, the able member of the homo genus. That is a great ape with the ability to make tools and use technology.

3. Harnessing of **(fire)** is one of the most fundamental technological breakthroughs.

4. Like many kinds of technology, for a technology like agriculture to **(diffuse)** from one place to another, it depends on **(physical geography)** because the climate, soil, water availability, weather patterns, temperature, and topography of the land must be suitable for that crop to be able to spread to new locations.

5. How we gather, store, and transmit information – **(Artificial Intelligence)**, writing systems, books, and even the physical media, whether it's paper,

integrated circuits, or memory chips that contain the data being transmitted – are all areas where technological breakthroughs have repeatedly reshaped human history, including the transport of goods and people.

6. **(Diffusion)** relies on physical geography, and for technologies like agriculture, a shared ecology is crucial for successful spread.

7. Technologies, including paper-making, the compass, and gunpowder, diffused from East to West between **(500 A.D. and 1500 A.D)**.

8. Around **(1500 A.D)** Europe became a leader in technological change.

9. Technological change propels one age of globalization to the next. The fourth age, the classical empires, includes the **(Roman Empire, Han Empire, Persian empires, and Indian empires)**, spanning roughly 1000 BCE to 1500 A.D.

10. **(Steam engines)** revolutionized industrialization, leading to the fossil fuel age.

Stage 3 – Learning Activities

In this section, you will find the different learning activities associated with this specific Class. We recommend that you begin by watching the lecture videos as a basis for the course and as a primary element for the course content. Interactive reference maps are mentioned in the lectures and activities.

Lecture Videos

Chapter 1 Video. Types of technology
Chapter 2 Video. Technological change
Chapter 3 Video. Innovation through all seven ages
Chapter 4 Video. Empire: Infrastructure
Chapter 5 Video. Ocean Age and Industrialization
Chapter 6 Video. Digital Age

Reference Maps

https://sdgstoday-sdsn.hub.arcgis.com/pages/ ages-of-globalization-data 3.2 The Lucky Latitudes and Climate Zones (AOG book)
3.1 The Origins of Agriculture (AOG book)
4.3 The Distribution of Wild Horses in the Late Pleistocene - Early Holocene (AOG book)

Download your free copy of the AOG book here.

Summary

In this section, you can find a summary of each Chapter in this Class for your reference. Chapter summaries provide insight into the era discussed in each class period. Should you have issues watching the videos, e.g. due to internet bandwidth, the summaries provide some of the key insight you can build on.

Video Lectures

Class 4 Chapter 1 Video Summary

- The lecture explores human change over 70,000 years, focusing on three main drivers: physical environment, technology, and institutions.

- Technology, specifically technological know-how and tools, is considered a significant long-term driver of human change that can be controlled by humanity.

- While institutions and environmental factors play a role, technological advancements, new tools, and engineering capabilities have consistently reshaped societies throughout history, from the earliest Homo habilis with tool-making ability to the present digital age and artificial intelligence.

- The harnessing of fire around 2 million years ago is considered one of the most fundamental technological breakthroughs, with fire playing crucial roles in cooking, hunting, protection, and tool strengthening.

- The economy is categorized into areas like food production, mining, construction, manufacturing, information and communications, transport, finance, education, healthcare, military technology, and public administration.

- Breakthroughs in technology, such as in agriculture, have occurred over millennia, transforming the way societies gather food.

- Different economic categories, such as manufacturing, information and communications, military technology, and public administration, have experienced significant technological breakthroughs throughout history.

- Technological advancements have led to revolutions in areas like healthcare, increasing life expectancy over time.

- Military technology, driven by technological changes, plays a crucial role in the ability to project power for defense or conquest.

- Governance and public administration have also seen technological advances throughout history.

- The lecture emphasizes that technology is multifaceted, multidimensional, and pervasive in human history, driving both positive advances in well-being and potential challenges such as increased conflict lethality.

Class 4 Chapter 2 Video Summary

- Tools, know-how, science, and engineering have changed over time in society and the economy. Two ways technology changes are through innovation, where a new idea or tool is created, and diffusion, where an idea from elsewhere spreads to a particular location.

- Diffusion can occur through copying, migration, trade, or conquest, with innovation often leading to temporary advantages for conquering parties.

- Society's isolation from technological advancements elsewhere can make it vulnerable, as seen in historical examples.

- Incentives for innovation often come from societal structures, with profit motives, patents, and intellectual property rights driving inventors.

- Diffusion relies on physical geography, and for technologies like agriculture, shared ecology is crucial for successful spread.

- The lecture discusses how Eurasia, due to its East-West orientation, had a natural advantage in technological diffusion, with innovations spreading over long distances. The lecture references Jared Diamond's observation that Eurasia's East-West orientation facilitated technological diffusion along a common ecological band.

- Agriculture, a fundamental technology, had independent innovations in different parts of the world, followed by diffusion.

- Climate and ecological factors determine the diffusion of agricultural technologies, with regions having similar conditions being more likely to adopt innovations.

- Technologies, including paper-making, the compass, and gunpowder, diffused from East to West between 500 A.D. and 1500 A.D.

- Around 1500 A.D., Europe became a leader in technological change, and the lecture hints at exploring the reasons behind this shift.

- Worldwide diffusion of technology has occurred from different parts of the world, highlighting the interconnected nature of human societies.

Class 4 Chapter 3 Video Summary

- In the Paleolithic age, the harnessing of fire was a significant technological advance, shaping the foundations of humanity.

- The Neolithic age saw the breakthrough of agriculture, enabling settled life, permanent crops, and the earliest forms of government.

- The use of metals, starting with copper and later bronze (an alloy of copper and tin), marked a crucial development around 4000 B.C.

- The equestrian age, around 3000 BCE, centered on the domestication of the horse, transforming transportation, trade, and military capabilities. Regions where horses thrived had a significant advantage, and horse domestication contributed to the rise of empires.

- The Bronze Age, coupled with horse domestication, led to powerful armies, rapid movement, and the emergence of the first empires.

- The early empires in Mesopotamia, Babylonia, Syria, Uruk, and Sumeria resulted from advancements in horse domestication and metallurgy.

- The rise of empires led to breakthroughs in governance, law, social organization, hierarchy, and cultural ideas.

Class 4 Chapter 4 Video Summary

- Technological change propels one age of globalization to the next. The fourth age, the classical empires, includes the Roman Empire, Han Empire, Persian empires, and Indian empires, spanning

roughly 1000 BCE to 1500 A.D.

- Significant technological advances occurred during this period, influencing various aspects of human activity.

- Innovations in infrastructure, such as the road network and aqueducts, marked the Roman Empire's grandeur.

- The Iron Age brought advancements, including the use of iron and later the production of steel, impacting economic and military tools.

- The breakthrough to the alphabet during the classical age is highlighted as a fundamental technology for sharing knowledge and information.

- The writing system, originating in Phoenicia and evolving in Greece, facilitated the spread of knowledge, law, trade, and societal organization.

- The combination of the Iron Age, horse use, and communication breakthroughs led to an acceleration of knowledge and the birth of philosophy and science.

- Alexander the Great's conquests played a crucial role in spreading Greek learning, philosophy, and science.

- Technological innovations, such as the Macedonian Phalanx, were decisive in Alexander's conquests.

- The lecture emphasizes the pervasive technological advances during the classical era in communications, materials, military technologies, and societal organization.

Class 4 Chapter 5 Video Summary

- The fifth, sixth, and seventh ages of globalization explore transoceanic empires, industrialization, and the digital age. Technological advancements in these periods acted as accelerators, distinguishing them from earlier ages.

- Breakthroughs in navigation by Portugal in the 15th century, influenced by Prince Henry the Navigator's School of Navigation, significantly advanced maritime exploration. China's retreat from ocean exploration in 1434 contrasted with Portugal's proactive approach.

- Transoceanic empires were marked by discovery, exploration, and directed scientific and technological advancements. Adam Smith regarded the discovery of the Americas and Vasco da Gama's

voyage as transformative events that triggered a massive wave of technological change, scientific advancement, and innovation.

◤ The transition from the fifth to the sixth age of globalization occurred in the 18th century, with Britain playing a crucial role in this transformation. During this period, Britain led the scientific revolution, which directed significant technological advances, particularly in mechanization and metallurgy.

◤ James Watt's improvements to the steam engine in the 1770s marked a decisive breakthrough, revolutionizing industrialization and paving the way for the fossil fuel age.

◤ The steam engine's impact on industrialization contributed to the rise of the British Navy and the British Empire, establishing Britain as the hegemon of the 19th century and reshaping global geopolitics.

Class 4 Chapter 6 Video Summary

◤ There was an acceleration in technological advances from the fifth age of globalization (transoceanic age) through industrialization to the seventh age (digital age).

◤ The industrial age, marked by James Watt's steam engine and mechanization, led to numerous breakthroughs across various domains, including information and communications, medical advances, military technologies, and transportation.

◤ The digital age is characterized by the pervasive influence of digital technologies, including computers, artificial intelligence, and the internet.

◤ Alan Turing, with his breakthrough articles in the 1930s, envisioned general computation, and his machines played a crucial role in deciphering codes during World War II.

◤ John von Neumann, another key figure, contributed to the architecture of the modern computer.

◤ The digital age's roots trace back to the 1930s and 1940s, with significant breakthroughs such as the discovery of semiconductors and the development of the first transistor in 1947.

◤ The transistor became a key component, leading to integrated circuits, paving the way for modern computers.

◤ The concentration of transistors has doubled every 18 months to two years for 60 years, following Moore's Law, resulting in a dramatic increase in computational power.

◤ The internet, invented in the 1960s and 1970s, further revolutionized information connectivity.

◤ Artificial intelligence, a culmination of specific applications of computation, now dominates in speed, problem-solving, and even forms of creativity.

Activities

In this section, you can find a range of interactive activities involving maps, community engagement and a capstone project, designed to engage students in exploring geographic, historical, and environmental concepts. These activities foster critical thinking and help students connect personal and community experiences with larger global patterns, encouraging them to take positive action in their schools and communities. You can use these activities in their entirety or select certain sub-sections, use them as in-class activities or assign them as homework or both, providing you with additional materials to help students showcase their understanding of the desired learning outcomes. For the maps, you can work with ArcGIS to

develop these maps or you can use your own maps.

Graphics Activites (Map, Data, Diagrams)

Activity: "What's it like in my locale/home" (50-60 minutes)

Materials: For this activity, students will need access to the internet to research their selected innovation or technology. Alternatively, students can listen to a guest speaker or a video on a specific technological innovation.

Activity Procedure:

Introduction (10 minutes):

- Start the session by welcoming the students. Mention that technology is all around us, and this activity will help them identify the various types of technology they interact with daily, as well as focus on a specific technological innovation.

- Ask the participants to take a moment to think about the types of technology they use every day. This could include personal devices, household items, communication tools, and more. Give them a few minutes to brainstorm individually (5 minutes).

- Invite each participant to share one piece of technology they use daily. Write these items on a whiteboard or flipchart as they are mentioned. Encourage participants to be specific and think beyond just smartphones and computers (5 minutes).

Tracking our use of technology (20 minutes)

- After listing several technologies, group similar items together on the board. For example, if someone mentions a smartphone and another mentions a tablet, group them under "Mobile Devices."

- Engage the group in a brief discussion about the importance of these technologies in their daily lives (5 minutes). Ask questions like:
  - How do these technologies make your life easier or more efficient?
  - What would your day look like without these devices?

- What would your day look like without these devices?

- Next, break the students into pairs or groups. Ask the students to write down the amount of time in hours that they use various technologies per week. For example, ask them the amount of hours they use smart phones each week. Ask them the amount of hours they use electricity each week.

- Have each group calculate the total and average number of hours that they use various technologies (15 minutes).
  - Which group uses technology the most? Which uses technology the least?
  - NOTE: This activity can be done using software

such as excel or google sheets. Students can graph the averages and total use of their groups' use of technology, using a pie chart, or similar.
  - Ask the students to eliminate their most-used type of technology. How does this affect the data?

- Conclude this section by encouraging participants to reflect on their relationship with technology and how this awareness might influence their daily interactions with it.

An invention from your community (20 minutes):

- Invite the students to use their mobile devices to research a specific innovation from their town or community. Alternatively, the facilitator/educator can provide a list of three options of an innovation or technology that originated in that community or country. Educators/facilitators could show a video explaining the innovation.

- Ask the students to research or explore (15 minutes):
  - What is the innovation or technology?
  - Why was it created?
  - By whom was it created?
  - Is it still used today?
  - How has it been adopted or modified from its original form?
  - Has it spread to other regions of the world?
  - How will technology influence the future? Will it be for the benefit or detriment of humanity?

Journal Activity

Journal Prompt

How will technology influence the future? Will it be for the benefit or detriment of humanity?

Community Engagement & Student Action Considerations & Capstone Project

Cultural Engagement "Explore your own language"
a. When did your language start using the writing

system?
b. Who developed it?
c. How has it transformed over time if at all?
d. What are some unique characteristics of your language / writing system?
e. Share your findings with another AOG classmate / peer from across the globe!

Community Engagement
a. Shift your focus to the current issues of the world in light of technology. What are some of the innovations in the current day that can help contribute towards curbing climate change? Please read the report to support your discussions and research: AR6 Synthesis Report Climate Change 2023: The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.: https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf
b. (1.1C) Select one or more key findings of the IPCC reports and identify creative ways to address them, through technological change, green manufacturing and transport, sustainable agriculture and transitioning to a circular economy.
c. (1.3. C) Explain the basic science underlying some renewable energy technologies which can help achieve "net zero".
d. (1.3.B) Engage with family, youth groups and other organizations to reduce carbon footprints and find potential ways to increase carbon capture naturally or through new technologies.
e. (1.7.C) Critically consider the potential contribution of technologies such as electric vehicles and hydrogen fuel to net zero.
f. (3.1.C) Research alternative systems of societal governance or policy interventions that could be potentially transformative for society (technological breakthroughs, alternative economic models, interventions for political accountability, legal system accountability of culpable actors).
g. (4.3.B) What are some actions you can take, to direct

your knowledge, skills, technologies, and economic activities toward supporting marginalized populations to better mitigate against and/or adapt to the climate crisis? Connect with your peers, friends, family members, community members to brainstorm.
h. (5.4.B) Identify existing and potential technological innovations in renewable energy sources in use in their community or country.
The #s in parenthesis point to UNESCO's Learning Objectives for the Sustainable Development Goals.

Capstone Project

Go back to your chosen SDGs. Considering how technology shaped human history in the past, how do you think it will continue to affect the world in the future? Will it help us achieve the SDGs or will it lead us further down our current unsustainable path?

Readings

Aeschylus, and Ernest Lang. Prometheus Vinctus. London: Smart & Allen, 1870.

#7 (p.v) - #16 (p.xii)

https://hdl.handle.net/2027/uiug.30112072020958

Hieroglyphics
Temple of Kom Ombo (Egypt)

https://www.britannica.com/topic/hieroglyph

Newton, Isaac, 1642-1727, and Percival Frost. Principia. [2d ed.] Cambridge and

#44 (p.22) - #54 (p.32)

https://hdl.handle.net/2027/njp.32101045521141

AR6 Synthesis Report Climate Change 2023

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related

to climate change. https://www.ipcc.ch/report/ar6/syr/
downloads/report/IPCC_AR6_SYR_LongerReport.pdf

*Wiggins, G., & McTighe, J. (2005) Understanding by design (2nd ed.).
Alexandria, VA: Association for Supervision and Curriculum Development ASCD