



Humanity's Attempt to Create Public Policies to Monitor Advancements in Artificial Intelligence Design

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This curriculum unit is recommended for:
American History II/ 11th grade

Keywords: Intelligence, Artificial Intelligence, Friendly AI, Machine Intelligence Research Institute, Singularity Theory, Alan Turing, American Dream

Teaching Standards: See [Appendix 1](#) for teaching standards addressed in this unit.

Synopsis: This unit examines the historical impacts of artificial intelligence (AI) advancements from Turing's "Imitation Game" through today's AI achievements, such as Google's self-driving car. Students will research how AI advancements have impacted the advancement of the American dream by developing their own poll. They will chart their poll findings. In mixed ability groups, they will create a movie that chronologically displays achievements in AI research. For this unit's capstone, students will write their own public policy for AI regulation and present their policy for discussion at a fictional AI conference (aka the teacher's classroom). Students will gain knowledge on the following research concepts: 1) How do intelligence and artificial intelligence compare/contrast? 2) What are the historical achievements in the field of artificial intelligence? 3) How has AI impacted the growth of the American dream? 4) Is it plausible for AI to become self-sustaining and human like? If so, when do computer scientists suggest that this might occur and what are the ramifications when it does occur? 5) How should we regulate the use of AI in American society, if at all?

I plan to teach this unit during the coming year in to 60 students in 11th grade, American History II.

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Angela L. Bates

Introduction

The intent of artificial intelligence (AI) research is to explore how the human brain operates in areas such as memory, language development and knowledge processing. Then, computer scientists use their knowledge of how the human brain functions to attempt to build intelligent machines that can replicate the processing skills of the human brain. The goal is to create artificially intelligent programs that can solve problems that historically have only been solved by human level intelligence. Leaders in the AI field argue that computer scientists will be able to create programs that surpass the human brain's ability to solve problems within the next 40 years.

The roots of artificial intelligence design can be traced back to Ancient Greek Mythology. Greek myths argue that Hephaestus, god of fire, iron and creativity, and son of Zeus, at the request of Zeus, smelted a bronze statue in the shape of a man known as Talos. Myths also suggest that Hephaestus built other beings similar to the modern concept of robots.(1) In 1206 A.D., Al-Jazari invented a castle water clock and mechanical boat, powered by water flow, that carried mechanical musicians on board.(2) In 1642, Blaise Pascal invented the first mechanical digital calculating machine to be used solely for addition and subtraction purposes.(3) Engineers and mathematicians then embarked on a long journey into research that would ultimately produce today's advanced computer systems. In 1832, Charles Babbage designed a programmable, mechanical calculating machine known as the analytical engine which Lady Ada Lovelace programmed.(4) This was the first automatic computing engine. In 1936, Alan Turing introduced his Turing Machine (Automatic Computing Engine), opening the doorway to the development of the "stored program computer".(5) The modern history of artificial intelligence began with the creation of stored program electronic computers. In 1956, John McCarthy coined the term "artificial intelligence" (AI) at the Dartmouth Conference.(6) Arthur Samuel, of IBM, created the first self-taught Checkers playing program in 1962.(7) In 1965, John Weizenbaum built an interactive computer program that had the ability to carry on conversations in English. The program is known as ELIZA.(8) In 1995, The Deep Blue Chess program became the first computer program to beat world chess champion Garry Kasparov in two matches.(9) By the early 2000's children played with robotic pets based on the original concepts of the mechanical toys that were created in the 1800's.

Modern artificial intelligence scientists and programmers have created machines that have the ability to think, problem solve and react to various conditions and situations. Ray Kurzweil, of Google, has suggested that computers will achieve human like intelligence by 2029.(10) Also, Kurzweil suggests that computers will have to the ability to achieve the equivalent of human information processing skills and surpass the human brain's processing abilities within the next 40 years. This concept is known as "the singularity". It can be defined as the period in which the abilities of computers have advanced beyond mankind's combined ability to comprehend it.(11) It is the point at which computers can invent new machines without human interaction, therefore leaving humans virtually obsolete. At one time, this was a radical idea, but inventions such as the voice recognition technology have made Kurzweil's timeline for these achievements more palatable.

Since artificial intelligence is a rapidly advancing field, it is destined to have an impact on culture and everyday living. Meteorologists are beginning to use artificial intelligence software to more accurately analyze data and predict weather patterns. This technology may assist in agricultural production and be able to divert aircraft from traveling through weather trouble spots. AI technology has been used to allow machines to perform tasks, such as disabling land mines, that are dangerous to humans. Machines may also be used to perform mundane tasks such as vacuuming household floors or mowing the lawn.

What is the impact of these technologies on culture and how does society regulate these advancements to protect the "American Dream"?

Rationale

Students use AI programs on a daily basis, whether it is Facebook suggesting people that you may know, to become friends with, or using a Netflix suggestions list to figure out which newly released film they want to stream and watch with their date on a Saturday evening. Technology and its advancements have eased the pains of completing research papers through Google Searches and brought an end to countless nights of students falling asleep on top of books that they had been researching for hours.

Although artificially intelligent technology has become commonplace to the point at which research for a paper can be completed through a cell phone, few students understand the origins and roots of the study of artificial intelligence. Advancements in technology are themes throughout American history, but little is discussed in American history classrooms about new artificial intelligence technologies and their impact on recent modern American culture. Classroom studies do not offer students the ability to investigate futuristic problems that may arise as a result of advancements in AI fields. This unit will introduce and define the concepts of intelligence and artificial intelligence. It is the intent of this curriculum unit to give students the opportunity to investigate

historical achievements in technology and AI, along with the impact of these achievements on the culture of the United States. Students will examine current uses of artificial intelligence and propose potential problems that may arise in the United States as advancements in the AI field increase. As a team, they will then use their findings to create an aspect of public policy to help monitor the use of AI and ensure that its benefits are good for humanity.

During this unit, students will work in pre-determined teams and use research they gathered to predict possible future problems regarding AI's advancement. They will develop policies, based on their knowledge level, to protect society from potential mishaps. This assignment will encourage students to develop research skills, teamwork and collaboration skills, reading comprehension and writing skills and higher level critical thinking skills. Students will be allowed to use the internet for research. They will use programs, such as Microsoft Excel, iMovie or Moviemaker to complete each of the two products for this curriculum unit.

School Background

This curriculum unit is designed to be taught to 11th grade honors or AP level American History students at Cato Middle College High School in Charlotte, NC. The school is a Cooperative Innovative High School located on the Central Piedmont Community College, Cato Campus near the University of North Carolina at Charlotte. The school is a part of CMS and North Carolina's Career and College Promise Program. The high school consists of only 11th and 12th grade students, with a year 13 option for this year's junior class. The year thirteen option allows students to remain in school for a year longer to complete required college coursework so that they may graduate, not just with a high school diploma, but with an Associate's degree, as well. Students take either honors or AP level classes in conjunction with college classes. College classes are taken at no cost for classes. Students must apply for admission to the school and are selected through a lottery process once they meet admissions standards. Eligibility for entrance requires an un-weighted GPA of 2.5. Students must pass Central Piedmont's Accuplacer Exam and must maintain good disciplinary and attendance records. The school's calendar is aligned with CPCC's calendar and the school operates on a block schedule to allow students to take college classes in the mornings. During the 2014-2015 school year, total enrollment of the school was 163 students. Sixty percent of students are minority students with thirty percent of students determined to be economically disadvantaged. Seventy one percent of the student body is female versus twenty nine percent of the student body being male. Most students are enrolled in advanced level or college prep courses. The school has maintained a 100% graduation rate since 2011, with one student graduating with an Associate's degree in the spring of 2013. The school employs six teachers, one guidance counselor, one financial administrator and one Principal. I teach American History I and II along with AP U.S. History each spring semester. Due to the fact that our students come from multiple high schools throughout Mecklenburg County, their ability levels tend to vary. I work diligently to research and design a wide range of

lessons that appeal to multiple learning styles. No two days are alike in my classroom. Students at Cato are encouraged to self-advocate and challenge content in an attempt to motivate their learning ambitions.

Students on our campus have access to computers in the CPCC Library and a CPCC Computer Lab. My classroom has one computer and one projector that are connected for instructional purposes. I have written a grant to acquire ten iPads for research and project purposes that will be accessible to all teachers within the school. I also have access to a VCR/DVD player in my classroom. I encourage my students to bring their personal laptops, computer, iPads and cell phones to class on a daily basis. My students commonly use technology to complete a variety of assignments including blogs, movie trailers and song collages. We do not use textbooks in class, even though the district provides them and they are assigned to each student. I typically research and provide all of the curriculum materials used for my Honors American History I and II classes, in alliance with North Carolina's Essential Standards. The College Board provides the curriculum guidelines for the AP U.S. History courses. Lessons are typically mixed with lecture, film clips, discussion or seminar activities and hand on projects. This semester, my class sizes vary from 14 students in a class to 27 students in a class. Students work in groups on a daily basis and are assigned to these groups based on skill levels they have demonstrated in class. Groups can vary in size from 2-4 students. Honors U.S. history students are expected to pass a state end of course exam. The AP students are expected to pass the College Board AP U.S. History exam.

I am working in a Professional Learning Community with another American History teacher who teaches on the CPCC Levine Campus. We meet bi-weekly to share lesson plans and curriculum ideas. We email tests and other assignments, while photographing and sharing examples of student products. This curriculum unit will be provided to my PLC partner for use in his American History classes, as well.

Content Background

A neophyte might refer to movies and science fiction novels to set parameters for a true definition of artificial intelligence. Most people have viewed Stephen Spielberg's 2001 film A.I. : Artificial Intelligence that focuses on a robotic boy that wants to become human like in order to "feel" parental love. Then there is television's Person of Interest in which the story line focuses on a machine that is programmed by computer programmer, Harold Finch, to predict terrorist attacks, but shifts and begins predicting common crimes. As the series advances, the audience sees the machine taking more control of its predictions with less human interaction.

These two pieces of entertainment define two major realistic concerns of the artificial intelligence community. The concerns are:

1) Can a machine have the ability to feel human emotion? If so, what are the psychological ramifications for humans who build a relationship with a machine? Is it possible for the machine, itself, to “feel” psychological ramifications from a relationship with a human?

2) If so, how are machines designed so that they will produce moral outcomes versus amoral outcomes?

To gain a complete understanding of what we are looking at in terms of these questions, the neophyte must first understand what intelligence means. John McCarthy, an AI pioneer and former professor at Stanford University, defined intelligence as, “the computational part of the ability to achieve goals in the world”. Varying kinds and degrees of intelligence occur in people, many animals and some machines.”(12) Based on this definition, Artificial intelligence is the ability to move the “computational element” of the definition and apply it to machines. In other words, machines should behave as humans would behave intelligently.

During the 1930’s and 1940’s, technology moved away from mechanically operated machines and took a turn toward an emphasis on automatic computation, playing off of the ideas based on Ada Lovelace’s 1832 computation machine. In 1936, the Father of modern computer science, British mathematician Alan Turing, invented a formal model for analyzing and reasoning about algorithms. This became known as Turing’s “universal computing machine”.(13) During World War II the German military created a coding device known as Enigma. The coding machine messages were nearly impossible to decipher because there were 158,962,555,217,826,360,000 possible message encryption combinations to decipher- Yes, that number is in the quadrillions. (14) Alan Turing, along with Polish scientists, built a decoding machine (aka “bombe”) that could decipher the Enigma. Turing’s cipher was decrypting over 84,000 German messages per month in the Fall of 1943.(15)

In 1944, Thomas Flowers developed Colossus. Colossus was designed to break German messages created by the German code machine Tunny. Flower’s Colossus computer proved that digital electronic computing was feasible.(15) Turing advanced Flower’s research by developing the first electronic stored program computing machine. (15) Today, this design is known as Turing’s “automatic computing engine”. In 1950, Turing wrote a famous paper that asked the question “Can a machine think?”. The purpose of the Turing test (or imitation game) is to challenge humans to ascertain whether they are talking to a machine or another human. If the computer is mistaken for a human more than 30% of the time, during the test, then the computer passes the Turing Test. In June of 2014, media generate hype suggested that the Eugene Goostman program would become the first computer program to pass the Turing Test during the annual Loebner Competition in London.(16) However, it is questionable if Eugene

Goostman is AI in the sense that Turing was looking for when he created his “imitation game”.

The imitation game does create other concerns when examining threatening possibilities as new AI is developed. Kevin Warwick, of the University of Reading, states, “Having a computer that can trick a human into thinking that someone, or even something, is a person, we trust is a wake-up call to cybercrime. It is important to understand more fully how online, real-time communication of this type can influence an individual human in such a way that they are fooled into believing something is true . . . when in fact it is not.”(17)

These types of technologies increasingly call upon elite computer scientists to ask whether or not new technologies will affect the world in a benevolent or malevolent manner. Eliezer Yudkowsky argues that Friendly Artificial intelligence (FAI) is determined by the degree of positive impacts AI has on a society versus plausible negative outcomes related to AI.(18) Yudkowsky writes that the greatest challenge to artificial intelligence research is that people believe too early that they understand AI and how differently it functions in given situations.(18) In other words, the repercussions of AI advancements may takes years to assess. Yudkowsky goes on to say, “Few people would push a button that they clearly knew would cause a global catastrophe. But if people are liable to confidently believe that the button does something quite different from its actual consequence. That is cause indeed for alarm.” (18) Yudowsky’s work at the Machine Intelligence Research Institute is focused on how to keep AI advancements balanced with the socially defined and accepted norms of humanity and the divergent societies within it.

Today, many scientists see AI as having the potential to better humanity. So, what measures have AI experts taken to assure the public that artificially intelligent beings will not accidentally destroy the world? Famed writer Isaac Asimov created Three Laws of Robotics that are to be programed into the “brains” of a robot. The laws can be found in his science fiction work *I, Robot*. The three laws are:

- 1) Robots may not injure humans or allow humans to be harmed.
- 2) Robots must obey orders given by humans, except when they are in conflict with the first law.
- 3) Robots must protect their existence as long as the protection does not conflict with Law 1 and Law 2.(19)

While Asimov’s writings are for sci-fi literary purposes, they do highlight the need for computer scientists to work on codifying behavioral laws for robots, even though robot

technology has not reached advanced behavioral stage. However, it is unclear how to implement these vague laws.

The Office of Naval Research is investigating this type of protection through funding an initiative to develop a robot architecture that “will be flexible enough to allow for a robot’s dynamic override of planned actions based on moral reasoning”.(20) This means that with new research, robots will have the internal ability to make and follow moral decisions. They will be autonomous and man will not have to tell them what to do. The challenge is to develop guidelines for what constitutes morality in humans, so that those guidelines can be transferred to robots. This seems to be the most problematic area of the research due to cultural and societal moral norms. Basically, it boils down to: Who determines what is morally right and morally wrong?

In addition, what are our alternatives if AI technology goes rogue throughout society? In his blog, “Why We Should Think about the Threat of Artificial Intelligence”, Gary Marcus argues that at the end of this century, machines will program themselves and absorb information in ways that humans have only begun to imagine and they will do it non-stop, twenty four hours a day, seven days a week.(21) Echoing Marcus’ sentiments, author James Barrat writes that future AI might have the capability of seeking and controlling what resources are necessary in order for the being to survive and this could possibly be at the expense of the human race. In his book, “Our Final Invention: Artificial Intelligence and the End of the Human Era” Barratt suggests that machines, in an attempt at self-preservation, may potentially attack people who are not willing to provide the resources the machine must have in order to reach its goal.(21)

Examples of these concerns include the concepts of “Killer Robots”. According to a BBC news report, “A killer robot is a fully autonomous weapon that can select targets without any human intervention.”(22) Supporters of killer robots argue that a robot may be better equipped to determine when to engage human targets and therefore lead to a reduction of casualties during battle. The concern by those in opposition to the use of robots in warfare centers focuses on the robot’s inability to make moral decisions that determine when to attack and the plausibility of not being able to recognize “friendly” combatants and therefore, firing on them. Currently, “killer robots” do not act without human intervention. However, the United States is active in the research, development and purchase of military robots such as the Modular Advanced Armed Robotic System (MAARS). The United States is also the leader for purchases of Unmanned Air Vehicles (UAVs), spending more than three times as much as the Chinese government on the weaponry.(23) Interestingly enough, world leaders are more concerned about this type of technology being possessed by extremist groups, more so than individual nations. In May of 2014, 117 countries met at the United Nations to discuss banning unmanned, autonomous military systems.(23)

While the fears of rogue robotic beings have become common place, thanks to the efforts of Hollywood and the entertainment industry, AI research is making positive strides to improve the quality of life for many humans. A well-known example includes Google's development of its self-driving car. The impending introduction of the self-driving car offers solutions to problems that plague life in America's cities. For instance, air pollution in major cities will likely decrease because of the potential to reduce the number of cars on the road. Self-driving cars could potentially eliminate city traffic congestion and the need for unaesthetic, multi-level parking decks within densely populated urban centers. Riders would no longer have to drive vehicles to and from work. Self-driving cars could easily be scheduled to pick riders up, even though there would be an increase in unemployment because the services of taxi drivers would no longer be needed. Google has tested the self-driving car and it has performed well in most driving situations.

However, how will government keep up with the regulation of traffic laws as more self-driving cars are on highways? For instance, in the state of California, a "driver is the person seated in the driver's seat".(24) If that is the case, then who will get the ticket if a self-driving car has a moving violation? California's state legislature has passed Senate Bill 1298 requiring the Department of Motor Vehicles "to adopt regulations governing the testing and use of autonomous vehicles on public roadways no later than January 1, 2015".(24) Local and state governments are now being required to examine policies, such as driving regulations, and adjust them according to advancements in artificial intelligence research.

Other target areas in which AI research focuses on increasing the quality of life include robotic prosthesis research, facial recognition software and telemedicine robots. Musician Jason Barnes and Professor Gil Weinberg created a prosthesis that will allow an amputee who has lost his arms to be able to flex and send signals to a computer that will connect to a drumstick and control the stick's bounce. Weinberg has also created a robotic drumstick in which the drummer can choose to let it play on its own.(25)

Further advancements in the medical field have led researchers at the University of Toronto to develop facial recognition software that can determine whether the expression of pain in the human face is real or faked.(26) This software is significant for medical doctors who may be examining patients who suffer from autism or other diseases. This type of software will also be beneficial for real world situations involving homeland security, job screening and law enforcement or trial proceedings.(26) Situations such as these will require additional public policies to be created by local, state and federal governments in an effort to protect innocent civilians or those who may be further implicated in wrongdoing through the analysis gathered by the facial recognition software. Surely there will be challenges to the laws that regulate this software in an effort to protect civil liberties, as well as protect the rights of victims.

A last example of artificial intelligence research improving quality of life is the development of telemedicine robots that allow doctors to interact with patients all over the world.(27) This technology allows patients to see specialists that may not otherwise be available to them because of geographical distance. The telemedicine robots offer rapid and efficient responses to medical emergencies. This is especially beneficial for hospitals located in more remote areas to stay abreast of new medical research and discoveries.

In conclusion, artificial intelligence research advances daily under a burdening weight that calls for research to increase the quality of life for humans, while corralling potential threats of advanced AI research going rogue within society. The challenge is to determine how governmental authorities are to monitor AI's advancements, while at the same time preventing researchers from creating machines that, when in the wrong hands, can cause catastrophic events. Government's duty is to prevent AI research from being abused by groups who have the wish to harm society, such as non-state supported extremist and terrorist groups. Twenty-five years ago, at the end of the Cold War, world governments were concerned about nuclear arms being in the wrong player's hands. This advanced technology is a call for a re-evaluation of major world actors interested in protecting the safety of mankind. Are AI advancements the "nuclear scare" of the future? This is a valid issue that world governments must continue to examine and create policies to check AI's use as we move through the 21st century.

Unit Objectives

Students will examine AI's origins and the impact that it has had on social and cultural norms and how the introduction of artificial intelligence led to a cultural fascination with science fiction during the 1950's, 1960's and 1970's. Students will use the information that they gather from their study to create a "moving timeline" to document major scientific, historical and cultural developments in the artificial intelligence community and their impact on society. The "moving timeline" will be created using software programs such as moviemaker or iMovie. Student timelines will detail the positive and negative impacts of these developments on society. Students will then determine which AI advancements have had the most impact through polling random classmates from within the school community. Poll results will be displayed on a chart or graph developed in Microsoft Excel and will be included in the conclusion of their moving timeline.

For the capstone of this unit, students will examine the concepts of Friendly Artificial Intelligence (FAI), artificial general intelligence (AGI) and artificial super intelligence (ASI). The desire is that FAI will help to promote the advancements of humanity rather than having a potentially negative impact on humanity. Its ultimate goal is to help humans. One must understand that this type of intelligence is ever-evolving and

changing. With these changes it is necessary to monitor the systems and make sure they stay within a realm of “friendliness”.

Students will research and collaborate together to determine what standards must be administered within the AI community to maintain the concept of friendly AI, as research progresses forward. Students will role play as if they were a part of a team of policy makers for the National Bureau of Advancements in Technological Studies (NBATS). Their job is to create sound policies that regulate the use of advancements in artificial intelligence technologies for the betterment of mankind. They will write policies and create standards so that new AI will have a positive impact on a society’s culture and well-being. Students will read excerpts from James Barrat’s book, Our Final Invention to examine AI and its possible dangers. Students will investigate new AI technologies being used from robotic prosthesis to Modular Advanced Armed Robotics Systems (MAARS). They will then choose one of the technologies that they researched and create a feasible public policy that monitors the use of their chosen AI technology for societal purposes. Student policies will be designed to answer questions such as:

- 1) What is intelligence?
- 2) What is Artificial Intelligence?
- 3) What are the benefits of this AI technology?
- 4) Is this an AI technology that can be mass produced in a non-costly manner to benefit the consumer?
- 5) Does this AI technology have the potential to have negative consequences? If so, what are they and how could they potentially be curtailed?
- 6) Who should have access to and the right to control this AI technology? Why?
- 7) How should the government go about implementing these policies to protect the “American Dream”?

Policies will be presented by the policy creator at the annual NBATS conference held in Charlotte, NC, each year (aka- the teacher’s classroom).

This lesson is meant to be taught to 11th grade American History I and II students. It is designed to promote skills in creativity and innovation; information, communications and technology literacy; along with career skills designed to develop initiative and self-direction within individual students. These skills are aligned with North Carolina’s 21 Century Learning Goals. A complete list of these goals can be found on ncpublicschools.org. This unit is also focused on increasing historical knowledge of the subject, improving technology usage skills, practicing research skills, elevating reading comprehension and engaging in higher order reasoning through role playing and policy

design. The objectives addressed are aligned with North Carolina Essential Standards and include, but not limited to objectives AH2.H.1.1, AH2.H.1.4, and AH2.H.8.1. AH2.H.1.1 asks student to identify the beginning, middle and end of a historical narrative or story. They must interpret that information and use it to create a timeline of a specific period in history. AH2.H.1.4 requires students to obtain historical data through research and use the historical evidence to support arguments in essays. AH2.H.8.1 asks students to analyze the relationship between innovation and progress to discover how they impact the American dream.

Research methods and writing skills will be the most difficult areas for students to master due to a lack of experience. Resources for research purposes, technology usage and writing have been included to assist Social Studies teachers in preparation for struggling students. Also, teachers using this curriculum unit must take into account the availability of various software programs and students' access to computers, laptops or even the internet. Most high school students own at least a cell phone with internet capability for research, but it will be up to the teacher to find software resources to create the moving timeline.

Teaching Strategies

Think-Pair-Share: Students are assigned to a partner. They are asked a question by the teacher. The students individually take two minutes to think about their topics. The students take a few minutes to brainstorm and discuss, with their partners, responses to the teacher's questions. Then the teacher will call on each pair to come to the front of the class to share their response with the entire class.

Cooperative Learning: Students work with each other, in small groups, to accomplish goals by creating and executing the plan to obtain their goal.

Experiential Learning: Learning by doing.

Inquiry Guided Learning: Students arrive at the understanding of concepts based on their own research. This encourages the development of research skills.

Socratic Seminar: Students are responsible for guiding discussion around a specific text. Students are to determine the significance of a piece of writing and discuss its importance/relevance with the larger group.

Writing Assignments: Students take what they have researched and apply it in written word. This allows students to develop critical thinking skills and writing skills.

Classroom Activities

Day One

Purpose

- 1) Students will explore the concepts of Intelligence and Artificial Intelligence.
- 2) Students will identify current examples of Artificial Intelligence.

Activities

Students will begin the curriculum unit by developing a “class” definition of intelligence through brainstorming. Based on their definition, the teacher will use direct instruction to define “artificial intelligence” and the teacher may also incorporate a short film clip of the teacher’s choice that will demonstrate the concept of artificial intelligence for students. Students will employ the teaching strategy of Think-Pair-Share to determine a minimum of five ways in which artificial intelligence has become common place within their daily lives. Students will share their findings with the entire class

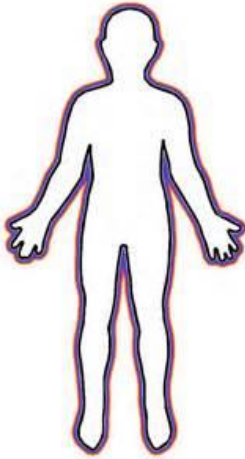
Days Two-Three

Purpose

- 1) Students will explore the origins of the study of artificial intelligence by investigating life and contributions of Alan Turing.

Activities

Students will be assigned to groups of four based on mixed abilities and skill level. Each group will create an historic portrait of Alan Turing explaining his life and contributions during the 1940’s and 1950’s. Students will be given a photo copied head shot of Turing (this can be found on the internet) and then draw a full portrait for rest of his body. They will then research Turing’s biographical information and contributions to artificial intelligence, as well as the significance of the role Turing played history. See below for an example portrait layout that students may follow in designing their portraits. They will label their portraits accordingly. Encourage students to be creative. You may have them to draw symbols that correlate with research that is gathered. Also, teachers should encourage them to color their portraits. Student groups will be expected to present their portraits in 2-3 minute presentation at the end of class on day three. See the diagram for design instructions.



Heart- Quote demonstrating Turing's contributions to society

Left Arm-Biographical data (family, childhood, education, career,)

Right Arm- What was Enigma and Turing's contributions to decoding Enigma?

Left Leg- Other contributions Turing makes in the field of artificial intelligence (Turing Test)

Left/Right Foot- Controversy surrounding Alan Turing; Date & cause of death

Head – Birthdate; place of birth

Days Four-Five

Purpose

- 1) Students will develop, with teacher guidance, a working definition of the phrase “the American Dream”.
- 2) Students will research innovations in artificial intelligence technologies between 1950 and today. Students will create a poll to determine what others believe to be the most significant AI advancements that have contributed to the advancement of the American dream since 1950.

Activity

Students will remain in the same mixed ability groups that they were assigned for the Turing Portrait. Student groups will research AI innovations and create a list of 10 innovations that contributed most directly toward the advancement of the “American Dream” today. The teacher needs to make sure that the students innovations are AI. For example, AI innovations include Google Search. They will then write a brief description of each AI discovery. Each student, in each group will perform an AI innovations poll and be required to ask a minimum of 5 random people to rank their group's list of AI advancements from most important to least important. Also, students should ask those they interview to briefly explain how they feel the AI innovation most directly contributed to the American Dream. Students will document these responses to use on later assignments.

Days Five- Six

Purpose

1) Students will create a graph that illustrates data collected from their AI innovations poll.

Activity

Based on this data, students will create a graph using Microsoft Excel to display their findings. The graph will be displayed at the end of the video timeline that will be created during days 7-9 of this unit.

Days Seven-Nine

Purpose

1) Students will research specific AI advancements and detail their reasons for the significance of the advancements, in a video format.

Activity

1) Students, in the same mixed ability groups, will create a video of a chronological timeline detailing the 10 AI innovations generated from the student polls. Each “scene” will explain the history of the development of the specific piece of AI and how it has contributed to the advancement of the American dream. The final “scene” will be the student created graphs that explain the importance of the AI advancements, based on the survey results of their poll. Videos will be uploaded on YouTube.

Day 10

Purpose

1) Students will view other group’s timelines.

Activity

Students will view the class produced video timelines. The teacher will lead a guided discussion focused on the variety of AI inventions that were discussed in the class videos with the intention of relating the student’s research and the implications these technologies have on the American dream.

Day Eleven

Purpose

1) Students groups will conduct a Socratic seminar based on various chapters from James Barratt’s Our Final Invention: Artificial Intelligence and the End of the Human Era.

Activity

Groups will be assigned to read various chapters from Our Final Invention: Artificial Intelligence and the End of the Human Era by James Barratt the day before the seminar is conducted. On the day of the seminar, the groups will have a 5 minute among themselves at which point they highlight the main idea that Barratt is trying to portray in their assigned chapter and any supporting details that he may offer. Then each group will select a member to be the “teacher”. Each group’s teacher will move to a separate group and spend 5-7 minutes teaching and discussing their chapter with the new group. After their time is up, the “teachers” will rotate and do the same with the next groups. They will rotate until each teacher has taught all groups. It is important to keep up with the time for this activity, so the instructor may want to use a timer or alarm. At the end of this activity, students will have covered multiple chapters of Barratt’s book.

Days Twelve-Thirteen

Purpose

- 1) Students will choose a piece of AI technology and write a piece of public policy that will allow government to regulate the technology’s use.
- 2) Students will determine methods to be used to protect humans from concerns that may arise due to the technology.
- 3) Students will develop methods to preempt possible abuses of the technology.
- 4) Students will create guidelines for everyone to have equitable access to AI technology. Policies will be created based around the following guiding questions:

What are the benefits of this AI technology?

Is this an AI technology that can be mass produced in a non-costly manner to benefit the consumer?

Does this AI technology have the potential to have negative consequences? If so, what are they and how could they potentially be curtailed?

Who should have access to and the right to control this AI technology? Why?

How should the government go about implementing these policies to protect the “America Dream”?

Activity

Groups will meet and brainstorm/research possible problems that may arise from the use of a specific piece of AI technology. For instance, a group may work to research policies

on how to regulate the use of “Killer Robots” by nations, during wars. Also, they may choose to discuss how to create equitable access of artificially intelligent prosthetics for amputees in underdeveloped nations. Students will role play as if they were a part of a team of policy makers for the National Bureau of Advancements in Technological Studies (NBATS). Their job is to create sound policies that regulate the use of advancements in AI technology. They will write policies and create standards, so that new AI will have a positive impact on a society’s culture and well-being.

Day Fourteen

Purpose

1) Students will present their policies at the annual NBATS conference and attendees will have the opportunity to challenge or critique each policy.

Activity

The teacher will turn their classroom into a fictional professional conference (NBATS) and structure the furniture in a “round table” format. Each policy team will present their public policy regarding a specific AI use. Each team will have 5-7 minutes to present their policies. When the presentation is complete, all attendees will have the opportunity to challenge the presentation and ask questions regarding information that is presented. Conference attendees will present hard copies of their policies to be bound in the NBATS Conference Journal.

Appendix 1 - Implementing Teaching Standards

North Carolina has adopted Common Core standards for American History II. The standards listed below are the ones that align with the goals of this curriculum unit.

AH2.H.1.1

Use chronological thinking to:

1. Identify the structure of a historical narrative or story (its beginning, middle and end).
2. Interpret data presented in timelines and create timelines.

This standard calls for students to practice and develop skills necessary to create a framework for a historical story through the collection of data and then present the data in an organized fashion, such as a timeline. This curriculum unit is designed to meet this standard through data collection gathered from a student generated poll and group research. The research and poll results will then be interpreted and used to create moving timeline in a movie format.

AH2.H1.4

Use historical research to:

1. Formulate historical questions.
2. Obtain historical data from a variety of sources.
3. Support interpretations with historical evidence.
4. Construct analytical essays using historical evidence to support arguments.

Students will interpret their research to analyze issues society may face through continuing AI advancements. They will then construct written public policy that regulates the use of a specific piece of AI using their research as supporting evidence for why their policy is necessary. Their public policy must be designed to assure that it protects the advancement of the American dream.

AH2.H.8.1

Analyze the relationship between innovation, economic development, progress and various perceptions of the “American Dream” since Reconstruction.

Students will research how developments in AI innovations have affected American society since 1950’s America. They will research a specific piece of AI and create public policy that promotes the use of the AI for advancement toward the American dream.

Appendix 2 - Annotated Teacher and Student Resources

“Artificial Intelligence.” Internet Encyclopedia of Philosophy.
<http://www.iep.utm.edu/art-inte/> (accessed May 9, 2014).

This resource is a good source to explain the concept of AI and early efforts by computer programmers to advance AI research.

Barratt, James. "The Busy Child." In *Our Final Invention: Artificial Intelligence and the End of the Human Era.* New York: St. Martin's Press, 2011. (accessed October 27, 2014).

Barratt’s book presents a discussion on the implications of a computer’s ability to surpass the capabilities of the human brain. He present a thought provoking look at potential of AI to break away from human control and accidently destroy mankind in an attempt of self-preservation. The book is a great tool for students to read and discuss if whether or not there is a need for society to regulate AI advancements.

Georgia Institute of Technology. “Robotic Prosthesis Turns Drummer In to a Three-Armed Cyborg.” March 6, 2014.
<http://www.sciencedaily.com/releases/2014/03/140306095121.htm> (accessed May 9, 2014).

This article provides an example of current AI research in the medical field. It is a good article for discussions on ways in which AI improves the quality of life for amputees and advances the American dream.

Jones, Josh. “The Enigma Machine: How Alan Turing Helped Break Unbreakable Nazi Code.” January 17, 2013.
http://www.openculture.com/2013/01/the_enigma_machine_how_alan_turing_helped_break_the_unbreakable_nazi_code_.html (accessed August 23, 2014).

This article provides historical background for Turing’s success in breaking the German Enigma code during WWII.

“ ‘Killer Robots’: Are They Inevitable’ ” BBC News. May 27, 2014.
<http://www.bbc.com/news/business-27332130?print=true> (accessed November 2, 2014).

This is a current article that investigates the use of AI technology in warfare.

“ ‘ Killer Robots’ to Be Debated at the UN’ ”. BBC News. May 9, 2014.
<http://www.bbc.com/news/technology-27343076> (accessed November 2, 2014).

This is a current article that investigates the use of AI technology in warfare. This is good for students to investigate when defining AI's impact on expanding the American dream through warfare.

Madrigal, Alexis C. "Google's Self Driving Cars Have Never Gotten a Ticket." *The Atlantic*. <http://www.theatlantic.com/technology/print/2014/05/googles-self-driving-cars-have-never-gotten-a-ticket> (accessed May 27, 2014).

This article summarizes the success of Google's self-driving car. This article is useful when discussing the possible implications of AI on everyday American society.

Marcus, Gary. "Why We Should Think About the Threat of Artificial Intelligence." *The New Yorker*. October 24, 2013. <http://newyorker.com/online/blogs/elements/2013/10/why-we-should-think-about-the-threat-of-artificial-intelligence> (accessed May 9, 2014).

This article examines James Barrat's *Our Final Invention* and examines the plausibility of Barrat's argument regarding AI research.

McCarthy, John. "What is Artificial Intelligence?" Stanford University. November 12, 2007. <http://www-formal.stanford.edu/jmc/whatisai/whatisai.html>. (accessed October 1, 2014).

Famed Stanford professor of computer science, John McCarty discusses basic questions and answers regarding the branches of AI and its applications. This is good material to use when first teaching student about what AI is and how this field of research has grown.

Proudfoot, Diane. "Alan Turing: Code Breaker and Computer Pioneer." *History Today*, Vol. 54. July 2004. <http://www.historytoday.com/diane-proudfoot/alan-turing-codebreaker-and-computer-pioneer> (accessed October 2, 2014).

This article examines the history behind Alan Turing's success in breaking the enigma code.

"Ray Kurzweil on the Singularity." YouTube. <https://search.yahoo.com/search?type=oberon&fr=oberhp&p=ray+kurzweil+and+singularity> (October 2, 2014).

This YouTube video explores Kurzweil's comments on the Singularity. It is a good discussion starter for students who are researching what will happen once AI's computer abilities exceed those of the human brain.

"Teaching Robots Right From Wrong." *ScienceDaily*. May 9, 2014. <http://www.sciencedaily.com/releases/2014/05/140509073929>. (accessed August 9, 2014).

This article discusses research on developing robots that are capable of making moral decisions. This is a good jumping off point for teachers when they are discussing the moral implications of AI research and how this could affect the concept of the American dream.

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