

SIEMENS STEM DAY ACTIVITY

THE DIGITAL TRANSFORMATION

OBJECTIVES

Students will be able to:

- **Conduct research** and select reputable and reliable resources
- **Explore** groundbreaking digital advancements within a specialized industry- either manufacturing, energy, healthcare, education, infrastructure, or consumer retail
- **Identify** patterns found by evaluating the impacts of automation and digitalization on our society, economy, and culture
- **Understand** the overarching effects technological advancements have had on the world

THIS LESSON FOCUSES ON

Engineering Design Cycle

- Communicating Results

21st Century Skills

- Collaboration
- Communication
- Critical Thinking

OVERVIEW

Students will evaluate the impacts of the digital revolution on our society, economy, and culture: more specifically, how the technological advances of automation and digitalization have impacted and changed the world. Teams of students will jigsaw manufacturing, energy, healthcare, education, infrastructure, and consumer retail to reveal some of the groundbreaking digital applications within these industries.

STEM incorporates Science, Technology, Engineering, and Mathematics to focus on real-world issues and problems guided by the engineering design process. This type of instruction supports students in developing critical thinking, collaboration, reasoning, and creative skills to be competitive in the 21st-century workforce.

Each Siemens STEM Day classroom activity highlights one or more components of the engineering design cycle and an essential 21st-century skill.

MATERIALS

- **“What is the Fourth Industrial Revolution- CNBC Explains” 3-2-1** Handout—one per person
- Digital Revolution Handout—one per person
- Computers with internet access

HAVE YOU EVER WONDERED . . .

If you were alive 50 years ago, how would life have been different?

MAKE CONNECTIONS!

How does this connect to students?

In current society, **automation** and **digitalization** are all around us. A VR headset now lets us experience the Grand Canyon without actually being there. People pay bills online with the click of a button. The digital transformation age allows people to not only experience the wonders of the world, but also save time with the use of more efficient digital tools. Understanding some of the advantages and disadvantages of this digitalization can help students to better understand historical changes that have impacted our society, economy, and culture.

How does this connect to careers?

A **digital solutions architect** has a passion for finding digital solutions through automatization and innovation. This role may involve working on gaming devices, designing new age robots, or even integrating the use of artificial intelligence to meet a company's needs. Many companies today use digital solutions architects to automate and digitize their business to save time and money.

STEM related careers

merge the fields of science, technology, engineering and mathematics to help solve the challenges the world faces today. The digital information age has promoted a shift in values from an emphasis on knowledge to collaboration, innovation, risk-taking, problem solving, and communication.

How does this connect to our world?

Real time access has become a standard within our society. Computer systems capable of reactive computing provide timely access to data and information for the user. For instance, on Google Docs, people can work together in the same document in real time.

Artificial intelligence has been significant in the advancements of automation and digitalization. The integration of AI allows software to learn from patterns and data features collected from exorbitantly large amounts of information. Intelligent algorithms and fast processing make this possible. With advances in AI and machine learning, automated systems are getting smarter and smarter.

BLUEPRINT FOR DISCOVERY

1. To engage students in what they will be learning, display the following quote: "We went from being the Flintstones to the Jetsons in 9 months."¹ By Dan Schulman, President and CEO of PayPal. Ask students to first individually write down what this quote means. Then begin a class conversation about this quote. When the discussion seems to be subsiding, explain to the students that today they will be learning about "The Digital Transformation."
2. Explain to the students that you are going to watch a video that will help them better understand this emerging Fourth Industrial Revolution. Ask students to pay particular attention to some of the advantages and disadvantages mentioned in the video.

¹ <https://medium.com/@InnovexaSolutions/10-digital-transformation-quotes-that-will-change-the-way-you-view-it-c57fcc5fcd80>

What is the Fourth Industrial Revolution- CNBC Explains

<https://www.youtube.com/watch?v=v9rZOa3CUC8>

3. At the conclusion of the video, instruct the students to complete the **“What is the Fourth Industrial Revolution- CNBC Explains” 3-2-1** Handout. Then discuss the students’ findings.
4. Explain that the students need to form teams of 3-4 students. Each group will select to either focus on jigsaw manufacturing, energy, healthcare, education, infrastructure, or consumer retail. If there are more than 6 groups, the topics can either repeat or students can select another topic that their group would like to explore. Pass out the **Digital Revolution** Handout, one to each student.
5. The purpose of this activity is for the groups to explore some of the groundbreaking digital advancements within these different industries as well as impacts of automation and digitalization have had on our society, economy and culture.
6. Before students begin researching, have a conversation about how to find quality sources. Remind students that typically site domains ending in .org, .edu or .gov are more creditable sources in comparison to .com websites. Next display the FDA.gov and Dartmouth.edu websites and emphasize how these resources generally provide more creditable and reputable information.
 - o <https://www.fda.gov/medical-devices/digital-health-center-excellence/what-digital-health#benefits>
 - o <https://sites.dartmouth.edu/dujs/2020/11/09/the-many-uses-of-ai-in-healthcare/>
7. To help students find more quality resources, show them how to filter their search after they type their search topic into the Google search engine. Explain that after hitting enter for their search, there is the word “Settings” that appears below the typed search. Select Settings and then click “Advanced Search.” Draw the students’ attention to the fact that their original search terms appear, but if they scroll down to “Then narrow your results by…” they can filter their search. Find the “site or domain:” heading and it is here that they can type in a selected domain such as .gov .edu or .org. Remind students to keep track of their resources they use as they research.
8. Provide the teams time to research and complete the **Digital Revolution** Handout.
9. Once the students have completed their research, it is time for them to share their information with the class. Since this was a jigsaw activity, students will be learning from what their classmates share. If time is a constraint, you may wish to ask the groups to select their Top 5 Most Fascinating Facts that they learned along with 2–3 advantages and 2–3 disadvantages of digitalization in their field of study.
10. As each group reports their findings to the class, keep a running list of the advantages and disadvantages on the board for all to see.
11. Upon conclusion of all presentations, take a moment for everyone to reread the compiled list of advantages and disadvantages of automation and digitalization from all of the fields of study. Engage students in a concluding discussion to identify the patterns and similarities that exists among all of the information.
12. Lastly, instruct the students to recap their learning by writing a 3–4 sentence summary about the overall impacts of automation and digitalization on our society, economy, and culture.

TAKE ACTION!

- Students can create a Public Service Announcement video or poster that will serve to educate the public on the impacts of the Digital Revolution within various fields of study.
- Students can be encouraged to continue this research for another field of their choice, for instances sports, veterinary medicine, or even fashion.

NATIONAL STANDARDS

Standards for Technology
Literacy

Standard 3: Students will develop an understanding of The Nature of Technology. This includes inquiring a knowledge of the relationship among technologies and the connections between technology and other fields.

Standard 4: Students will develop an understanding of Technology and Society. This includes learning about the cultural, social, economic and political effects of technology.

Standard 13: Students will develop Abilities for a Technological World. This includes becoming able to assess the impact of products and systems.

Next Generation Science
Standards

SEP8: Obtaining, Evaluating and Communicating Information

“WHAT IS THE FOURTH INDUSTRIAL REVOLUTION- CNBC EXPLAINS” 3-2-1

List 3 things that you learned:

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-
-

List 2 things that you found interesting:

-
-

List 1 question you have:

-

The purpose of this activity is for your group to explore some of the groundbreaking digital applications related to automation and digitalization. Then evaluate the impact these changes have had changes on our society, economy and culture.

Industry Topic: _____

Use resources to define the following:

automation:

digitalization:

Examples of Automation in the Field of _____	Examples of Digitalization in the Field of _____

DIGITAL REVOLUTION (CONT.)

Next evaluate the impact that these changes have had on our society, economy, and culture.

	Impacts of Automation and Digitalization in the Field of _____
Society	
Economy	
Culture	