TOP | TRANSATLANTIC OUTREACH PROGRAM

CIVICS

AUTO MANUFACTURING IN THE 21st CENTURY

What are best practices in 21st century automotive manufacturing?

Middle School

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What are best practices in 21st century automotive manufacturing?

C3 Framework Indicator	**D2.Eco.7.6-8., D2.Geo.4.6-8. D3.3.6-8., D4.1.6-8.**	
Staging the Compelling Question	How are cars made? Have students create a concept map of what their ideas are regarding car manufacturing. How do they think cars are manufactured? This concept map can include pictures and words.	
Supporting Question 1	**Supporting Question 2**	**Supporting Question 3**
How does robot technology shape modern car manufacturing?	What are the cultural differences between German and U.S. car manufacturing models?	What are sustainability initiatives in the car manufacturing industry?
Formative Performance Task	**Formative Performance Task**	**Formative Performance Task**
Create a class inquiry board: Include questions about manufacturing and the use of robots in manufacturing. Create a flow chart on how robots are used in the manufacturing process.	Add to the inquiry board: What do you notice about car culture and how that translates into car manufacturing?	Brainstorm what sustainability issues are and what they include. Choose one milestone from the video to explore further. Report findings to class. Add to the inquiry board: What considerations should be made for sustainability in car manufacturing?
Featured Sources	**Featured Sources**	**Featured Sources**
Video: BMW Group Plant Leipzig **Video:** F-150 Factory Tour **Documents: "**Step-by-Step Process of Manufacturing a Car**" and "How Are Robots Used in Car Manufacturing?"** **Video BMW Car Factory Robots**	**Video: "**Driving Culture Clash**"**	**Video:** Sustainability Concept of the Neue Klasse **Sustainability Vocabulary Handout** **Video: BMW Group Plant Leipzig Sustainable Milestones**
Summative Performance Task	**Argument: What are best practices in 21st century automotive manufacturing?** Students create a white paper in which they research and recommend their proposed best practices in manufacturing. Their research should include possible problems and solutions to their proposals.	
	• **Extension:** Students create a poster showcasing their proposed recommendations. • Students create a slideshow presentation of their recommendations. • Students create a video using generative technology to showcase their recommendations.	
Taking Informed Action: Using your voice to make change	**Understand:** Students can take action in their community by illustrating how car culture influences our daily lives.	
	Assess: Students can assess how their recommendations impact their daily lives and choose one to follow.	
	Act: Students can write a letter to the editor, representative, or governor explaining how we can look globally to understand local challenges and include their recommendations.	

Germany’s Multi-Party System

Target Grade Level: 6-9	Target Course: Social Studies; Contemporary World Issues

Compelling Question

What are best practices in 21st century automotive manufacturing?

Inquiry Overview

This is a 10-day inquiry-based learning unit designed to have students explore how innovative automobile manufacturing techniques are used in Germany and the U.S. Students will learn about robotics, sustainability practices, and compare the culture of German and American manufacturing models to answer the compelling question: What are best practices in 21st century automobile manufacturing? The inquiry will culminate with students developing their recommendations for best practices in automobile manufacturing.

Teacher Background Information

Teachers should be familiar with Germany’s automotive sector--Germany’s primary export is automobiles. Teachers should have some background knowledge on Germany’s innovation in manufacturing, sustainability, and the nation’s focus on renewable energy sources. Finally, teachers should have general knowledge of robotics in manufacturing and some background on the cultural factors that influence German and American industrial practices.

Potential misconceptions to be addressed include: the assumption that all manufacturing plants operate similarly worldwide. Teachers should try to address how cultural values, approaches to technology, and economic differences influence how manufacturing is practiced in different countries.

Suggested Time Frame

10 Days

Concept List

- **Sustainability Initiatives:**
  - Germany: Recycling practices, Eco-Friendly Manufacturing; Renewable materials
  - United States: Fuel Efficiency Standards, Electric Vehicles, Recycling Initiatives
- **Renewable Energy:**
  - Germany: Wind, Solar, Hydrogen Fuel Development, use of “battery farms”
  - United States: Solar, Government Incentives, Wind, Hydropower
- **Robotics**
  - Germany: Advanced Robotics, Collaborative Robots
  - United States: Automation in Assembly Lines, Robotic Innovation
- **Cultural Influences:**
  - Germany: Precision, Quality, Vehicle Production Standards, Privacy; Collaboration and Teamwork, Plant Design for Innovation and Collaborative Work
  - United States: Entrepreneurial Spirit (Elon Musk: “Move fast, blow things up, repeat”), Workforce Diversity, Unions and Worker’s Rights

Instructional Resources

- Chromebooks for research,
- Videos and Handouts (linked in plan),
- Writing Guides,
- Chart Paper,
- Whiteboard, or Smart Board

NCSS Thematic Strands

- People, Places, and Environments;
- Individuals, Groups, and Institutions;
- Production, Distribution, and Consumption;
- Science, Technology, and Society; Global Connections

C3 Framework Indicators

- **D1.1.6-8., D1.4.6-8. , D2.Eco.7.6-8., D2.Geo.4.6-8., D3.1.6-8., D3.3.6-8., D4.1.6-8., D4.2.6-8., D4.7.6-8.**

Outcomes for Student Learning

By the end of this unit, students will:

- Understand the role of manufacturing and robotics in the automotive industry.
- Analyze sustainability initiatives in modern car production.
- Compare and Contrast German and U.S. automobile cultural manufacturing models.
- Evaluate global best practices for car manufacturing.
- Produce a professional “best practices” white paper.

Germany-Related Learning Goals

- German car manufacturing and robotics integration.
- German sustainability and renewable resources initiatives.
- German car culture.

Compelling Question

What are best practices in 21st century automotive manufacturing?

Introductory Activity

Have students create a concept map of what their ideas are regarding car manufacturing. How do they think cars are manufactured? This concept map can include pictures and words.

Divide the students into groups, students will discuss and analyze how technology can shape modern car manufacturing. Encourage groups to consider the following in terms of the technology needed:

1. Design
2. What works best for the market?
3. Marketing, Brand, Cost to Produce, Raw materials needed
4. Laws and Certification of Car

Supporting Question 1

How does robot technology shape modern car manufacturing?

Formative Performance Task 1

- Watch segments of the Video: BMW Group Plant Leipzig and note the technology used in the manufacturing process. Discuss key features of design and robotics. Then watch the F-150 Factory Tour and note differences and similarities in each factory. **Create a class inquiry board: Brainstorm questions about manufacturing.** Compare plant processes with student ideas about car manufacturing.

- Have students read the articles: "Step-by-Step Process of Manufacturing a Car" and "How Are Robots Used in Car Manufacturing?" Students create a flow chart on how robots are used in the manufacturing process. Students then watch the video BMW Car Factory Robots and check off where they see robots in their diagram working in the video. **Add to the inquiry board: How can robots impact future jobs?**

Resources

F150 Factory Tour | How Ford Builds An F-150 Every 53 Seconds - The Haul. American Trucks, 6 Mar. 2019, https://www.youtube.com/watch?v=ze4MZbyLnm8.

Hill, Dan. Step-by-Step Process of Manufacturing a Car. NRTC Automation, 2024, https://www.nrtcautomation.com/blog/step-by-step-process-of-manufacturing-a-car.

New 2025 BMW 2 Series - PRODUCTION process in Leipzig. REC Anything, 1 Nov. 2024, https://www.youtube.com/watch?v=ITn7mUi-QZk.

Zappa, John. How are Robots Used in Car Manufacturing? RoboticsCareer.org. Advanced Robotics For Manufacturing Institute, 18 Aug. 2021, https://www.roboticscareer.org/news-and-events/news/23035.

Supporting Question 2

What are the cultural differences between German and U.S. car manufacturing models?

Formative Performance Task 2

Review the video on "Driving Culture Clash."
As students watch the video, they create a Venn diagram to compare U.S. and German car culture.
Add to the inquiry board: What do you notice about car culture and how that translates into car manufacturing?

Resources

Ashton, Type. DRIVING CULTURE CLASH: Why do our Cars LOOK so Radically Different? theblackforestfamily, 30 July 2023, https://www.youtube.com/watch?v=aVY80gfAXZ4.

Supporting Question 3

What are sustainability initiatives in the car manufacturing industry?

Formative Performance Task 3

- Students examine sustainability initiatives. Sustainability Vocabulary Handout. Brainstorm what sustainability issues are and what they include. Watch Sustainability Concept of the Neue Klasse. Students take notes on German sustainability initiatives. Watch U.S. Automotive Sustainability Initiatives. Students take notes on U.S. automotive industry initiatives. Discuss how they are alike and different. What do they tell us about culture?

- Watch BMW Group Plant Leipzig Sustainable Milestones. In partners, choose one milestone from the video to explore further. Report findings to class. Add to the inquiry board: What considerations should be made for sustainability in car manufacturing?

Resources

BMW Group Plant Leipzig: MINI Countryman Electric Production & Sustainable Milestones. Automotive Network, 15 Nov. 2023, https://www.youtube.com/watch?v=aJVGIBt1aII.

Driving Toward a Greener Future: Sustainability Initiatives of Top Automotive OEMs. Lou Fusz Automotive Network, 18 July 2024, https://www.youtube.com/watch?v=0U1cgGF1gUs.

Our Sustainability Concept of the Neue Klasse. BMW Group, 22 March 2024, https://www.youtube.com/watch?v=m085SjYtYMA.

Summative Performance Task

Essay / Presentation	Students create a white paper in which they research and recommend their proposed best practices in manufacturing. Their research should include possible problems and solutions to their proposals.
Extension	• Students create a poster showcasing their proposed recommendations. • Students create a slideshow presentation of their recommendations. • Students create a video using generative technology to showcase their recommendations.

Taking Informed Action

Understand	Students can take action in their community by illustrating how car culture influences our daily lives.
Assess	Students can assess how their recommendations impact their daily lives and choose one to follow.
Act	Students can write a letter to the editor, representative, or governor explaining how we can look globally to understand local challenges and include their recommendations.

Modifications for Differentiation

Include guided notes; modified summative task to outline; Venn Diagrams; vocabulary handouts; Speech to text for notetaking; generative tools for poster creation using original ideas.

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Thompson Falls
Junior High