What are "Made in Texoma" Lesson Plans?

Made in Texoma (MIT) Lesson Plans are classroom materials designed to enrich science, technology, engineering and mathematics (STEM) classes. These FREE instructional resources provide your students with real world scenarios relevant to manufacturers throughout the Texoma area. **We appreciate the prior work of the Florida Advanced Technological Education Center (FLATE) and other regional centers supported by the National Science Foundation Advanced Technological grant for making these materials available for use by teachers in the Texoma Region!**

Each Lesson plan gives teachers the materials needed to engage students with authentic and sometimes unresolved challenges faced by manufacturing companies today.

Lesson Plans Include:

Teachers

- Lesson plan
- Reference sheet
- Answer sheet
- Company info sheet
- Grading rubric
- Presentation or video *(if applicable)*

Students

- Instructions scenario
- Handouts needed for the lesson

Choose your classroom level

&

Be ready to have fun with our lessons!!!

- **ELEMENTARY SCHOOL LESSONS**
- **MIDDLE SCHOOL LESSONS**
- **HIGH SCHOOL LESSONS 9th-12th grades**

ELEMENTARY SCHOOL LESSON PLAN 1 SCAVENGER HUNT

Length: One – Two Hours

Objective: Students will:

- Identify various educational resources for elementary school using Made in TEXOMA website.
- Describe how different things are manufactured in Texoma
- Identify major companies that make things in Texoma
- Identify different careers in modern manufacturing

Materials:

- Made in Texoma website – http://www.madeintexoma.org
- MIT Scavenger Hunt student worksheet
- Made in Texoma Video http://madeintexoma.org/videos/

Description of Activity:

1. This can be done individually or in teams of 2.
2. Ask the class "Name something you think is made in Texoma?" Examples to share :) El Monterrey Mexican food, parts on school busses, parts on airplanes and space ships (Denison, Texas); barricade tape, pennant flags, adhesive tape, valves, milk containers (Sherman, Texas).
3. Give each student/team the MIT Scavenger Hunt worksheet
4. Allow 20-30 minutes for students to watch Made in Texoma Video.
5. Using a flip chart (in the front of the room) have each student/team come up and write the "3 things they learned" about Made in Texoma or jobs they thought were cool.
6. As a class, discuss the items listed. Expand on the importance of science, technology, engineering, and math classes in middle and high school.
7. Have the class brainstorm about ways which manufacturing sectors are used in everyday activities (systems engineering, leisure & entertainment, transportation, medical devices, food, beverages, paper and cosmetics, aviation and aerospace, electronic devices, and metal & plastics).

ELEMENTARY SCHOOL LESSON PLAN 1 SCAVENGER HUNT

WORKSHEET

Team Name: _____

Watch Made in Texoma Video http://madeintexoma.org/videos/ and try to find as many things as you can (listed below):

Name a company featured in the “Made in Texoma” video. What do they make?

_____

List 3 things about manufacturing jobs you thought were cool

_____
_____
_____

List 3 products by category made in Texoma

Food or Beverage

_____
_____
_____

Metals & Plastics

_____
_____
_____

Electronics & Technical Instruments

_____
_____
_____

WHAT IS MANUFACTURING?

- A place where stuff is made
- A place where people work who like to make new things
- A place with neat machines and technology
- A place where everyone works together as a TEAM!

EVERYTHING HAS TO BE MADE SOMEWHERE!

SO WHAT IS MADE IN TEXOMA????

WHAT DID YOU FIND?

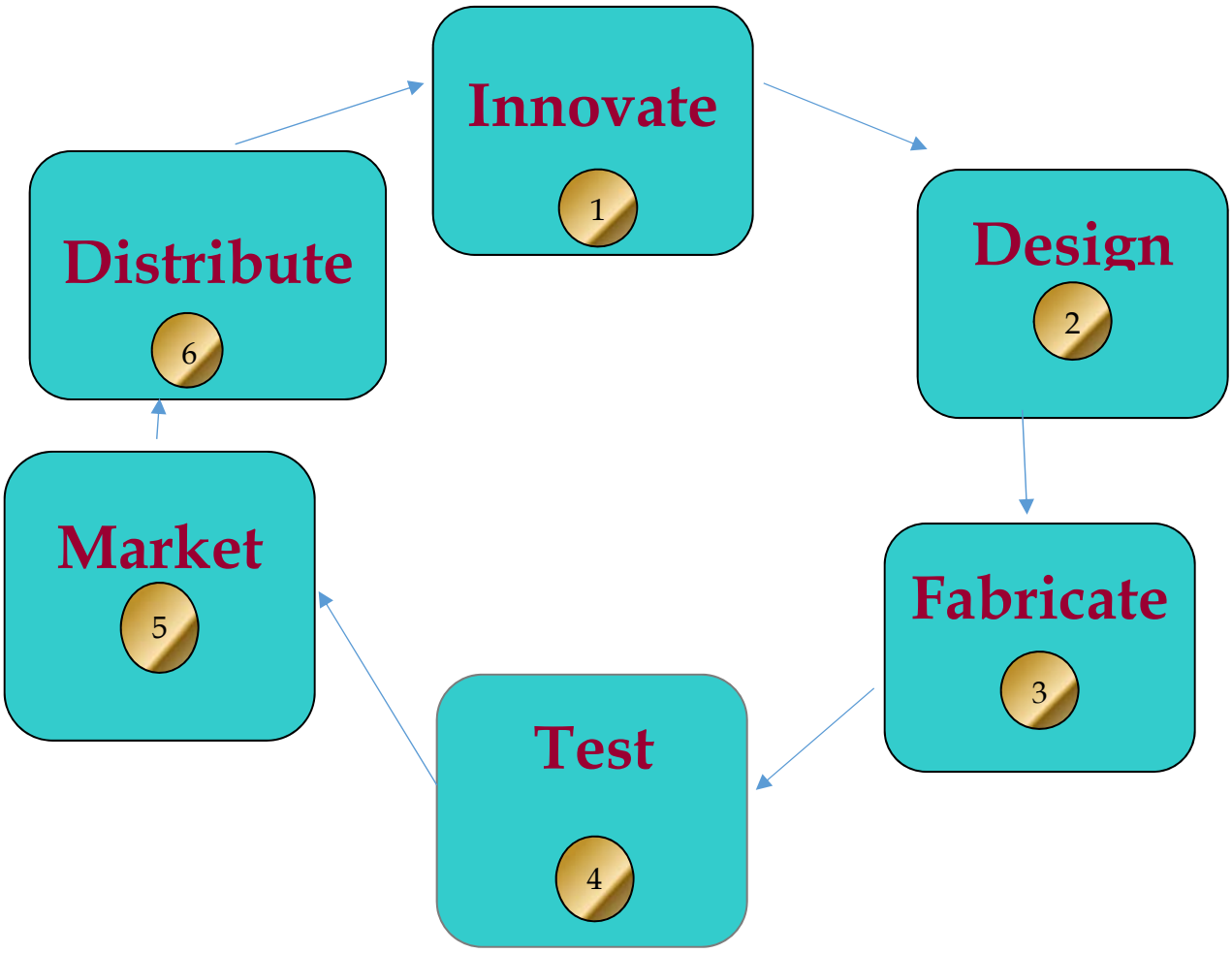
1.
2.
3.
4.
5.
6.
7.
8.

Manufacturing Goal

1. **MAKE SOMETHING THAT IS NEEDED**
2. **MAKE A LOT OF THEM**
3. **MAKE MONEY ON WHAT YOU MAKE**
4. **MAKE A LOT OF MONEY TO HIRE MORE PEOPLE TO MAKE MORE OF WHAT IS NEEDED**

How we make "stuff"

The Manufacturing Cycle



LET'S MAKE SOMETHING!!

1. What do you want to make?

Design & Innovate

2. How can we do that?

Fabricate & Test

3. How & where can we sell it?

Market & Distribute

Let's start our Manufacturing Teams

- Make 4 groups
- Groups will: sketch out new invention using manufacturing process
- IMPORTANT….TEAM WORK!

Respect, Listening, Speaking, Adapt

Innovate & Design

Innovate
Design
1
2

1. Name of the factory
2. What are we making?

What will it do?

What will it look?

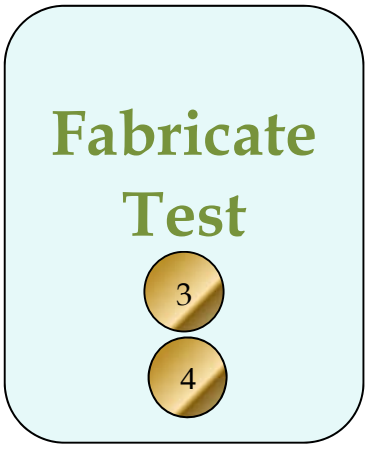
How it will perform?

How it could be built?

You have 10 min, start now!

Fabricate & Test

It's time to make things happen!



Fabricate

- What do we need?

Materials, Skills, technology

- How we make it faster?

Fabricate

- What do we need?

Materials, Skills, technology

- How we make it faster?

You have 10 min, start now!

Market & Distribute

Market
Distribute

5

6

- How to market?
- Who is buying it?
- How many?
- Distribution?

You have 10 min, start now!

Presentation of Manufacturing Teams

5 minutes per team!!!

Remember

MANUFACTURING is

Fun + Great pay =

Great Lifestyles!

HIGH SCHOOL LESSONS 9th-12th grades -We gratefully appreciate the prior work of the Florida Advanced Technological Education Center (FLATE) and other regional centers supported by the National Science Foundation Advanced Technological grant for making these materials available for use by teachers in the Texoma Region!

This lesson explores the potential of finding a career in manufacturing while challenging students to consider and use science and engineering principles. It is designed to be used with the EducateWorkforce course "Exploring Advanced Manufacturing" developed through a partnership between two National Science Foundation Centers for the Advancement of Technological Education, CA²VES and FLATE. It is important for students to be exposed to as many career options as possible to help them find what best suits their talents, interests and skills.

Level: Grades 9-12

Lesson Duration: Three 45-minute class periods. Can be condensed or extended as needed.

Lesson Objectives:

After completing this course, the learner will be able to:

- Explain how modern advanced manufacturing differs from common perceptions of the manufacturing industry
- Describe what you would see in a modern manufacturing facility
- Differentiate between various career pathways within the manufacturing industry including: production, maintenance, quality assurance, logistics, process development, and safety
- Describe the education and skill requirements needed to have a successful career in manufacturing
- Compare average manufacturing salaries to the average salaries in other industries

Summary of Tasks/Actions:

Day 1 – Exploring Advanced Manufacturing

1. *5 min — Introduction*

As a possible hook into the lesson, start a brief discussion by asking the students to brainstorm as a whole class what they think technology is. Collect examples in classroom of old technology to get them thinking (a pencil, a fork, a book). There is no need here to finish the discussion here, just get the students thinking. Familiarize the students with the navigation of the course, pointing out how they access the eBook (you may want to have this downloaded for them beforehand), and courseware. Go over the course introduction, goals, and objectives with them briefly, highlighting how this course is relevant to them.

2. *15 min — Exploring Advanced Manufacturing*

Have the students explore the first module, watch the videos, read the accompanying ebook pp. 1-8 for more information, and complete the "Perceptions of Manufacturing Activity," "Manufacturing Sectors Activity," and "Careers in Manufacturing Activity."

3. *10 min — Introduce and watch the TED talk video "How I built a toaster from scratch." "* (see handout for link)

Revisit your earlier conversation about technology and ask the students how hard it would be to make a pencil if there were no more pencil factories? How hard would it be to make a toaster?

Summary of Tasks/Actions (cont.):

Day 1 – **Exploring Advanced Manufacturing (cont.)**

4. *15 min — Toaster video discussion activity*

Ask the students to discuss in their groups the question, “How is manufacturing important in our everyday lives?” Give the students time to think, discuss, and share with one another in partners or small groups before asking for some ideas from the whole group. (See *Student Handout: Toaster Video Discussion*).

Day 2 – **Manufacturing Career Clusters**

1. *15 min — Explore the “Manufacturing Career Clusters” module*

Explore the module by reading the material and watching the videos.

2. *20 min — Make a graphic organizer comparing the education, responsibilities and skills of two or three manufacturing career clusters.*

Have them explain which cluster appeals to you the most (See *Student and Teacher Handout: Graphic Organizer for Careers*). This could be done as another group activity or individually.

3. *10 min — End to the lesson*

As an end to the lesson, ask the students to explore the “A Hands-on Virtual Experience” section of the course. This gives them a taste for virtual reality which will likely be a big part of their future work experience.

Day 3 – Next Steps

1. *20 min — Next Steps Exploration*

Have the students explore the content, videos, and links in the Next Steps portion of the course.

2. *25 min — Identify people in your community who work in manufacturing and ask if they would be willing to be interview subjects.*

Your experts may not be easily accessible for students to interview, and so creating an email survey may be more practical. Divide students into groups to write interview questions using Google docs (for in person interviews) or Google Forms (for an email survey). Students will likely need help writing questions. Scaffolding this by brainstorming as a whole class or in groups, suggesting question categories, and providing examples will be helpful to them (See *Teacher Handout: Interview Activity*).

3. *Going Beyond*

Have the student groups put the data they collect into a graph to visually represent the response of the people that they interviewed. Have them analyze their data by drawing 2-3 conclusions on what it tells them about a career in manufacturing?

Materials/Equipment:

- EducateWorkforce.com online course “EAM101 Exploring Advanced Manufacturing”
- “Exploring Advanced Manufacturing” eBook
- Access to Google Apps or similar applications

References:

- Center for Aviation and Automotive Technological Education using Virtual E-Schools (CA^2VES)
- TED Talks video https://www.ted.com/talks/thomas_thwaites_how_i_built_a_toaster_from_scratch?language=en#t-11338

Take Home Task:

Interview someone you know who works in the manufacturing sector (student will need help formulating questions.)

Student Handout: Graphic Organizer for Careers

Make a graphic organizer comparing the education, responsibilities, and skills of two manufacturing clusters.

Cluster A:		**Cluster B:**	
Job 1:	Job 2:	Job 1:	Job 2:
What education do you need?	What education do you need?	What education do you need?	What education do you need?
What are the responsibilities?	What are the responsibilities?	What are the responsibilities?	What are the responsibilities?
What skills do you need?	What skills do you need?	What skills do you need?	What skills do you need?
Explain which job interests you the most and why it attracts you. What skills or talents do you already have the will help you in this job? What skills and education do you need to acquire or develop for this job? How will you acquire them? What concerns do you have about preparing for this career?			

Student Handout: Toaster Video Discussion

To be used with TED Talk video "How I Built a Toaster from Scratch"

Video link: https://www.ted.com/talks/thomas_thwaites_how_i_built_a_toaster_from_scratch?language=en

Discuss in your group the question, "How is manufacturing important in our everyday lives?" Discuss, share, and record your ideas with one another before sharing with the whole group.

1. Why would it be difficult for you to make a toaster?

2. How do technology and manufacturing influence one another?

3. How have your ideas of technology changed?

4. Synthesize your ideas by explaining in a few sentences by explaining how manufacturing is important in our everyday lives.

Teacher Handout: Graphic Organizer for Careers

Make a graphic organizer comparing the education, responsibilities, and skills of two manufacturing clusters.

Cluster A: *Production*		**Cluster B:** *Logistics and Inventory Control*	
Job 1: *Machinists and Tool & Die Maker*	**Job 2:** *Industrial Production Manager*	**Job 1:** *Cargo and Freight Agents*	**Job 2:** *Production, Planning & Expediting Clerks*
What education do you need? • *High School* • *Professional Certifications*	What education do you need? • *Bachelor's Degree*	What education do you need? • *High School* • *Professional Certifications*	What education do you need? • *High School* • *Professional Certifications*
What are the responsibilities? • *Use blueprints and CAD files* • *Calculate dimensions* • *Align cutting tools and work pieces*	What are the responsibilities?	What are the responsibilities?	What are the responsibilities?
What skills do you need? • *Analytical* • *Math & computer* • *Mechanical* • *Technical*	What skills do you need?	What skills do you need?	What skills do you need?
Explain which job interests you the most and why it attracts you. *Answers will vary but try to encourage students to think about and explain why they are attracted to a particular job.* What skills or talents do you already have the will help you in this job? *Answers will vary.*			

What skills and education do you need to acquire or develop for this job? How will you acquire them? *Answers will vary but encourage students to begin planning how they would get needed education.*

What concerns do you have about preparing for this career? *Answers will vary.*

Teacher Handout: Interview Activity

Identify people in your community who work in manufacturing and ask if they would be willing to be interviewed or surveyed (either in-person or via email) by your students.

Divide students into groups to write interview questions using Google docs (for in person interviews) or Google Forms (for an email survey). Students will need help writing questions and showing them some of the example questions provided below, might be helpful to them.

You will want this to be a positive experience for your students that shows them the attractiveness of manufacturing as a career option. Vetting the potential interview candidates might be useful in ensuring this outcome. Students may want to interview family members or people they already know who work in manufacturing so this may not always be possible.

Rather than just giving the students questions with which to conduct the interview, encourage their conceptual thinking skills and creativity by having them write their own. Brainstorm as a whole class or in individual groups. Start by getting the students to think about what they want to find out from their interviewee and begin developing questions from there. Since class time is not an infinite resource, you may eventually need to give them some of the questions. You could require that certain percentage of questions be original.

Question Categories

- What work is like
- State of the industry
- Money and advancement
- Skills and experience

General Questions

1. What company/field of manufacturing do you work in?
2. What are your responsibilities?
3. Why did you choose job?
4. What do you find satisfying or fulfilling about your job?
5. What do you like the most about your job?
6. What do you like the least?
7. What skills/education/training do you need for this job?
8. What do you find challenging about your job?
9. Describe a typical work day.

Links for more information

- *https://mgt.buffalo.edu/career-resource-center/students/networking/mentorlink/40-questions-to-ask-in-an- informational-interview.html*
- *https://www.quintcareers.com/information-interview/*
- *http://bestcareermatch.com/interview-questions*
- *https://www.themuse.com/advice/3-steps-to-a-perfect-informational-interview*
- *http://www.collegecareerlifeplanning.com/Documents/4%20Career%20Planning/j%20Networking%20Internships/ Questions%20to%20Ask.pdf*