Assembly Line

Preview of Main Idea
The development of the assembly line was critical to the success of Henry Ford’s Model T vehicle and to the development of Detroit as the Motor City. The efficiencies of the assembly line allowed the vehicles to be produced much faster than previously possible and therefore to be priced so that many families could afford it. In this lesson the students will participate in an assembly line production.

Objectives
The students will:
1. Participate in an assembly line process and learn about its efficiencies
2. Design and produce an individually made car
3. Use fine motor skills to create auto parts

Materials
1. Construction paper of various colors
2. File folders
3. Stapler
4. Scissors
5. Body and Frame Template
6. Bumper Template
7. Window and Tire Template
8. Glue sticks, tape
9. Photos and film clip of auto factories showing assembly line process

Note: The teacher will need to construct one sample automobile using the parts above to show to the students.

Teaching Activities
1. Opening the Activity
   Center activity – Making the Parts
   Assembly lines take the parts that have been made elsewhere and assemble these parts into a completed automobile. The students will assume the important role of automobile parts supplier.

   In the days leading up to the Assembly Line activity it will be necessary to produce the parts needed to build the car. Have the students cut out the parts needed on the assembly line. Assuming two assembly teams will be formed, a stock pile sufficient to assemble up to 50 cars is recommended. If a third team is added, parts for 75 cars may be needed.

   While the teacher may choose to cut out the parts independently of the students, it may be desirable for the students to perform this task themselves.

   A. Students use a template to trace the needed parts onto paper.
   B. Students carefully cut out the parts.
   C. Sort the completed parts and place in storage area.
Assembly Line

D. Continue this activity until there is enough material to make 50 cars.

Parts List
1. Frame – (50) 1 per car, typing paper, white
2. Body Piece – (200) 4 per car, construction paper, various colors
3. Windows – (200) 4 per car, construction paper, white
4. Tires – (200) 4 per car, black
5. Bumper – (100) 2 per car, typing paper, white

Template List
1. Frame and Body
2. Windows and Tires
3. Bumper

Teacher Preparation for the Parts Making Center Activity

Using the provided templates, the teacher will create the parts templates using file folders or other durable materials. Students will cut out the parts needed for assembly. The teacher should make one car so that the students know what the model will look like.

Frame
1. Make 50 photocopies of the frame / body template.

*Note: The balance of the parts are attached to the frame.*

Body
1. Place the frame / body template on a file folder
2. Trace around the template
3. Cut out the Body template
4. Cut template in half vertically
5. Cut template in half horizontally (This will make 4 identical body templates.)
6. Cut 200 6x6 squares of colored construction paper.

Windows and Wheels
1. Photocopy 50 of the combined Window and Wheel Template
2. Cut in half to create 50 wheel strips and 50 window strips.

Bumper
1. Make 6 copies of the bumper template.

Student Activities in the Parts Center

Frame
The student will:
1. Carefully cut out the template.
2. Discard waste.
3. Place in the basket designated for the frame.

Body
The Student will:
1. Place the template on colored construction paper
2. Trace around the template
3. Carefully cut out the body
4. Discard waste
5. Place in the storage area designated for the body pieces

Window
1. Place the window template on white construction paper
2. Staple the template to the construction paper
3. Carefully cut out the pieces
4. Discard waste
5. Place the windows in the designated storage area

Wheels
The Student will:
1. Place the wheel template on black construction paper
2. Staple the template to the construction paper at the points indicated
3. Carefully cut out the pieces
4. Discard waste
5. Place the wheels in the designated storage area

Bumper
The Student will:
1. Carefully cut on the lines
2. Discard waste
3. Place the bumpers in the designated storage area

2. Continuing the Activity
“Craftsman” Automobiles.

Prior to the development of the assembly line, cars were produced using the “Craftsman” method. The Craftsman Method produced well-made cars, but it was a slow and expensive process. In addition, each car was at least a little bit unique often making repairs difficult. Furthermore, the skills required of the craftsman workers often took years to learn making it difficult to find sufficient workers to meet the demand.

In contrast, most mass production assembly line jobs could be mastered very quickly – in hours or a few days. This allowed the industry to tap into large pools of unskilled labor to rapidly grow the industry to meet consumer demand.
Assembly Line

In this activity the students will produce a single car, made in any manner they wish and with any materials they choose. This “hand-made” activity will later be contrasted with that of the assembly line.

While they should be shown a sample of what is expected, do not offer students the use of the auto parts created in the center “Making the Parts” activity. Use of these materials will greatly reduce the individuality and creativity that is inherent in hand-made craftsmanship and will detract from the purpose of the lesson.

Materials:
1. Paper in a variety of colors
2. Scissors
3. Glue
4. Markers or crayons
5. Other materials as desired

Student Instructions:
1. Show the students the model of the car that they will be making during the assembly line activity.
2. Tell the students that they will create a car of any design.
3. Using any available materials, allow the students to design and make an automobile.
4. Allow as much time as necessary to complete this “handcrafted” car.

3. Concluding the Activity
   Assembly Line

   1. Show the assembly line photographs and film clip. Discuss, pointing out to the students the efficiencies as well as the working conditions.
   2. Arrange students at tables to facilitate the assembly line activity. In order to accommodate classes of different sizes, the specific assignments may need to be modified. See below.
   3. Be sure that each workstation has all of the parts and materials needed to do the job.
   4. Teach each student how to do his or her task.
   5. Each student “worker” performs his or her own task and becomes proficient at it.
   6. Continue assembling the cars until the materials are gone.

Assembly “jobs”:

Note: The basic work group is 8 students. The italicized jobs are additional roles created to allow teachers the flexibility to “fully employ” all students.

Job 1: Student initiates assembly process by giving a frame to worker 2.
Assembly Line

Apply front body panel. The frame must be passed so the front of the car is heading down the assembly line. This ensures the workers are working on “side 1” first.

Note: If this position is used, they could also be given the role of Body Repair Worker and Supervisor. Cars that reach the end of the line with some flaw can be given to Job 1 to fix or reassign to the responsible worker to repair. They could also assist the team in any other way necessary.

Job 2: Glue front and rear body panel to side 1. Pass car to the next worker.

Job 3: Apply front and rear tires to side 1. Pass car to the next worker.

Job 4: Apply front and rear windows to side 1. Flip the car to side 2 and pass car to the next worker.

Job 5: Glue front and rear body panel to side 1. Pass car to the next worker.

Job 6: Glue front and rear tires to side 1. Pass car to the next worker.

Job 7: Glue front and rear windows to side 1. Pass car to the next worker.

Job 8: Glue one end of a bumper to the front of the car (this would be side 2) and one end of another bumper to the rear of the car. Flip the car and pass to the next worker.

Note: Since the bumpers must hold the car together so it can stand upright, they may need to use tape instead of glue to hold the bumper on. (Tell the students they will be bolting the bumper on instead of welding it on!) It may be worthwhile to try glue first. If this doesn’t work, modify the process only after the first process doesn’t work!

Job 9: Fold the car in half length-wise and attach the bumpers to the front and rear of the car. The “finished” car should now be able stand on it’s own. Pass the car to the next worker (or move to the storage lot. If this is the last job in the process, the storage lot should be within arms reach.)

Job 10: Given the relative complexity of the previous task, an extra set of hands may be helpful. Thus, if it is necessary to create another job to obtain “full employment”, make this task a two-person job.

Job 11: Carry the completed car to the storage lot in a distant part of the room and return for the next car. Along the way, the car should be inspected and returned to the worker at Job 1 for repair.

Job 12: If necessary, a separate repair person job could be created. This is the last resort and should only be used to obtain “full employment.”

Note: The steps listed above describe the individual tasks required to build one car. As noted above, the actual process will depend on the number of students available to work on the assembly line. The teacher should assign only one job per student.
Discussion Questions
1. What did you like about making your own car design and making it any way that you wanted to make it? Is there anything about it that you didn’t like doing?
2. What did you like about making the cars on the assembly line? Was there any part of working on the assembly line that you didn’t like?
3. Did you become better at your job after a few cars? Did you develop new ways to do your job as time went on?
4. Which method made the most cars?
5. Which method made the best cars?
6. Which method made all of the cars look much the same?
7. Which method made all of the cars look different?
8. Would you rather make any car design that you want or would you rather make a car on the assembly line?
9. Why do you think that the auto companies make cars on an assembly line instead of making them one by one?
10. What would you do to improve the assembly line process you used?

Extending the Activity
1. For younger students the assembly process can be simplified by reducing the number of parts involved in the assembly.
2. For older students, more parts or parts more complex to assemble may be added. Among the possible additions are axles, color stripes and hubcaps.
3. Upper elementary students may be interested in designing their own automobiles and their own assembly process. The cars produced could be given to students from a younger class.
4. Add an additional challenge to the students to produce the least amount of waste.
5. Students write about their experiences “on the line” or about producing the car as a “craftsman” designing and producing their car independently.
Assessing the Learning

1. The students participated in the assembly line process.
2. The students designed and produced an individually made car.
3. The students compared / contrasted the assembly line and the independently made “Craftsmen” methods.
4. The students stated an efficiency of the assembly line method.
5. The students made a statement regarding what it is like to work on an assembly line.

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<thead>
<tr>
<th></th>
<th>None or poor participation</th>
<th>Fully Participated in the activities</th>
<th>Excelled at the activity</th>
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<tbody>
<tr>
<td>Participated in assembly process.</td>
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<tr>
<td>Designed / produced individually made car.</td>
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<tr>
<td>Compared assembly line work with “Craftsmen” method.</td>
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<tr>
<td>Stated an efficiency of assembly line production.</td>
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<tr>
<td>Made personal statement about working on assembly line.</td>
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Additional Resources

Assembly work video
http://www.macomb.k12.mi.us/wq/alvaro/video.htm
Lucy and Ethyl at the candy factory
http://fortunecity.com/lavender/meyer/22/avi.htm
Assembly Line Practice
http://www.nasaexplores.com/show_k4_teacher_st.php?id=021223124748&gl=k4

Social Studies Standards Addressed

A. Strand V – Inquiry
   Content Standard 1 - Information Processing
      Early Elementary
      Benchmark 1 - Locate information using people, books, audio/video recordings, photos, simple maps, graphs and tables.
      Benchmark 2 - Acquire information from observation of local environment.