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| **TEXAS CTE LESSON PLAN**[www.txcte.org](http://www.txcte.org) |
| **Lesson Identification and TEKS Addressed** |
| **Career Cluster** | Science, Technology, Engineering & Mathematics |
| **Course Name** | Engineering Design and Presentation II |
| **Lesson/Unit Title** | Writing about Research |
| **TEKS Student Expectations** | **130.411. (c) Knowledge and Skills**(3) The student develops skills for managing a project. The student is expected to: (A) implement project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project; (B) develop a project schedule and complete projects according to established criteria; (C) participate in the organization and operation of a real or simulated engineering project; (D) develop a plan for production of an individual product(9) The student designs systems using appropriate design processes and techniques. The student is expected to:(A) Interpret engineering drawings.(D) Produce engineering drawings to industry standards  |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | Student will be able to:* Solve a design problem that has a positive impact on society or the environment
* Research, design, and create a product that is marketable
* Explain the steps to create your prototype
* Create the technical drawings per the check list and examples given
* Organize paperwork into a three-ring binder notebook per rubric
* Create a “BLOG”ineering website per the rubric given
* Demonstrate the ability to work effectively as a team member working on a team project
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| **Rationale** | Upon completion of this lesson the students will be able to apply all of the knowledge and skills they have learned to create a prototype that meets the criteria given in the Engineering Design Process/Problem Solving Grading Rubric; and will create many different methods of communicating their ideas and present their research and results based on the criteria in the Engineering Design Notebook Checklist/Rubric and the “BLOG”ineering Design Process Website Rubric to the satisfaction of the teacher. |
| **Duration of Lesson** | Teacher’s Discretion |
| **Word Wall/Key Vocabulary***(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | * Word, PowerPoint (or equivalent software)
* One (1) handout for each team of:
	+ The Engineering Design Process
	+ The Engineering Design Process/Problem Solving Grading Rubric
	+ “BLOG”ineering Design Process Website Rubric
	+ Engineering Design Notebook Checklist/Rubric
* A three-ring binder for each team
* Writing utensil for students who don’t have any
* Computer with internet access
* Printer
* Data projector for student presentations
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | **Introduction:***NOTE: The class discussion is meant to be Socratic in nature and not true/false, or this is the only correct answer. Encourage your students to explain WHY they think the way they do! There is NO wrong answer if they can explain the WHY!***SAY:** You will now begin the actual design process.**SHOW:** The Engineering Design Capstone Research Project: Part 2 EngineeringDesign Notebook Checklist/Rubric and “BLOG”ineering Design Process Website Rubric.**ASK:** Does anyone want to share what they have picked as their product problem to solve or improve upon?**SAY:** This will be an ongoing project until the very end when you present the final product and that’s ok andto be expected. Make sure you show/keep examples of all the designs you come up with in your notebook and on the “BLOG”ineering website. The final examples of your designs will go into both notebook and website and be used in your presentation.**ASK:** Why does your team need to keep a notebook and a “BLOG”ineering website for your product?**SHOW:** Notebook example of what is expected.*(If this is first time you are doing this lesson you may not**have one. That’s ok, but have an example that shows how to organize it at least.)***SAY:** This too will be an ongoing project until the very end when you present the final product and that’s okand to be expected. Make sure you show/keep examples of all the designs you come up with in your notebook and “BLOG”ineering website. The final will go into both notebook and website and be used in your presentation.**SAY:** Now it’s time for you to go to work. Good luck and have fun!**NOTE:** Remember the “Three before me” rule but check team’s progression daily so that they keep on task.If they set up the Team Contract correctly they should self-monitor and adjust but it’s always a good idea for the teacher to monitor to make sure they are improving daily. |
| **Direct Instruction \*** | Instructors can use the handouts, and note pages in conjunction with the following outline.Week 2 and 3: Design Process, Research,“BLOG”ineering, and Technical Drawings* Day 1-2 (3 if needed MAX) = Begin the Design Process
* Day 3-10 = Create your teams’ free “BLOG”ineering website per the rubric given
* Day 3-10 = Use a CAD program such as Inventor or Solidworks to create your prototype technical drawings electronically BEFORE you build it. You can change these as needed due to changes made when you build the prototype.

NOTE: “BLOG”ineering website and technical drawings are part of the ongoing project and won’t be completed until the very end and should be used in that final presentation.Week 1: Brainstorming, Engineering Design Process and TeamworkWeek 2 and 3: Research, “BLOG”ineering, and Technical DrawingsWeek 4 and 5: Construct the prototype and create all the media for presenting their product Week 6: Presentations and prepare for final exam As soon as students have a working idea for their product, allow them to start to build the prototype. Be forewarned this process can end up being only 1 week long, to 3 weeks long. Make sure they spend at least 1 week and a MAX of 3 weeks in this.I. Begin the actual Design Process.II. Distribute handouts and three ring binders A. Each team gets one (1) handout of: i. The Engineering Design Process ii. The Engineering Design Process/Problem Solving Grading Rubric iii. “BLOG”ineering Design Process Website Rubric iv. Engineering Design Notebook Checklist/Rubric B. Each team gets a three-ring binderIII. Does anyone want to share what they have picked as their product problem to solve or improve upon?IV. Why do you think we do the final technical drawings in a CAD program and not by hand?A. Make sure you show/keep examples of all the designs you come up with in your notebook and “BLOG”ineering website.B. The final technical drawings will go into both and be used in your presentation.V. Why does your team need to keep a notebook and a “BLOG”ineering website for your product?VI. How to setup website and example.VII. Notebook example of what is expected.A. Make sure you show/keep examples of all the designs you come up with in your notebook and “BLOG”ineering website.B. The final technical drawings will go into both website and notebook and be used in your presentation.VIII. Time to get to work!A. Refer to handouts, and rubricsB. Remember “Three before me” rule – before teacher will answer questions:i. Ask three (3) team members what you are supposed to doii. All four (4) teams ask teacher the same question at onceiii. Then teacher will answer the question*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*None |
| **Guided Practice \*** | Monitor periodically to make sure that the teams are creating their own product technical drawings, notebook, and “BLOG”ineering website per examples, checklist, and rubrics. Remember the “Three before me” rule but check team’s progression daily so that they keep on task. If they set up the Team Contract correctly they should self-monitor and adjust but it’s always a good idea for the teacher to monitor to make sure they are improving daily.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*NONE |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | * Technical Drawings
* Notebook
* “BLOG”ineering website

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*NONE |
| **Lesson Closure** | * Have you come up with a design solution to the problem you selected?
* Are you creating your technical drawings per the checklist/rubric and examples given?
* Are you creating a “BLOG”ineering website per the rubric given?
* Why do you think we do the final technical drawings in a CAD program and not by hand?
* Why does your team need to keep a notebook and a “BLOG”ineering website for your product?
* Are you showing/keeping examples of all the designs you come up with in your notebook and “BLOG”ineering website.
* How is the design process working for your team? (If not working, sit down with the team and help guide them into figuring out what to do. Teacher should mediate and not just tell them what to do.)
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| **Summative/End of Lesson Assessment \***  | **Informal Assessment:**Check team’s progression daily so that they keep on task. If they set up the Team Contract correctly they should self-monitor and adjust but it’s always a good idea for the teacher to monitor to make sure they are improving daily. You want them to do the work not you. They need to apply everything they should have learned to date. Just monitor their work and do not automatically “bail them out” with what you feel is the correct or best answers.**Formal Assessment:*** Technical Drawings (Engineering Design Notebook Checklist/Rubric) = “Major grade”
* Notebook = “Major grade”
* “BLOG”ineering Design Process Website Rubric = “Major grade”

Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to: |
| **References/Resources/****Teacher Preparation** | * You will need 1 copy of each of the handouts listed in Materials Needed, and a three-ring binder (recommend 1”-2”).
* Have pencil, eraser, and map pencils available for students who don’t have any.
* You need to have an example of a notebook to show, or an example of how to organize one, and an example of a “BLOG”ineering Design Process Website.

NOTE: Some teachers feel more comfortable ASSIGNING the problem. If you do, then just “Google” this and use what you feel fits best. A good website is: <http://www.sciencebuddies.org/engineering-design-process/engineering-design-problem-statement.shtml>. However, you will be amazed at what the students come up with if you give them more flexibility and thus they have more ownership and this usually results in better quality products. |
| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy****Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies****Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication****90 Second Speech Topics** |  |
| **Other Essential Lesson Components** |
| **Enrichment Activity**(e.g., homework assignment) | Students who need a challenge cannot just look up potential patents, but take steps to get their product patented.<http://www.uspto.gov/web/patents/howtopat.htm> |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSATechnology Student Association (TSA) |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)