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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 I |
| **Lesson/Unit Title** | Researching Careers in Electronics |
| **TEKS Student Expectations** | **130.410. (c) Knowledge and Skills**(2) The student gains knowledge of and demonstrates the skills necessary for success in the workplace. (A) The student is expected to distinguish the differences between an engineering technician, engineering technologist, and engineer(B) The student is expected to identify employment and career opportunities(C) The student is expected to investigate and work toward industry certifications(D) The student is expected to demonstrate the principles of teamwork related to engineering and technology(E) The student is expected to identify and use appropriate work habits(F) The student is expected to demonstrate knowledge related to governmental regulations, including health and safety(G) The student is expected to discuss ethical issues related to engineering and technology and incorporate proper ethics in submitted projects(H) The student is expected to demonstrate respect for diversity in the workplace(I) demonstrate appropriate actions and identify consequences relating to discrimination, harassment, and inequality(J) demonstrate effective oral and written communication skills using a variety of software applications and media(K) explore career preparation learning experiences, including job shadowing, mentoring, and apprenticeship training |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | The student will be able to:1. Define ethics relative to computer usage2. Discuss appropriate behaviors relative to computer usage ethics3. Define terms associated with the electronics profession4. Identify various sources for obtaining employment information5. Conduct keyword and Boolean searches on various Internet search engines6. Collect relevant information from various sources |
| **Rationale** | Through this lesson, the student will be able to research information related to job requirements for various job titles in the field of electronics and identify ethics with computer usage and copyright policy by taking the Ethics Quiz and Vocabulary Quiz. |
| **Duration of Lesson** | Teacher’s Discretion |
| **Word Wall/Key Vocabulary***(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* | Electronics organizations* IEEE- Institute of Electrical and Electronic Engineers is the world’s largest technological professional organization.
* ISCET- International Society of Certified Electronics technicians helps train, prepare, and test technicians in the electronics and appliance service industry.
* ASEE- American Society for Engineering Education is committed to furthering education in engineering and engineering technology.
* TechAmerica- Formerly the Information Technology Association of America, TechAmerica is the leading voice for the U.S. technology industry and the “Champion of Innovation.”
* CEA- Consumer Electronics Association is a source for information about the consumer electronics industry.
* EIA- Electronic Industries Alliance is a trade organization that represents the United States high technology community.
* GSA- The Global Semiconductor Alliance’s mission is to accelerate the growth and increase the return on invested capital of the global semiconductor industry by fostering a more effective ecosystem through collaboration, integration, and innovation.
* IMAPS- International Microelectronics Assembly And Packaging Society is dedicated to the advancement and growth of the use of microelectronics and electronic packaging.
* MATEC- Through its Advanced Technological Education (ATE) program, the NSF established the Maricopa Advanced Technology Education Center to promote the development of a world-class work force in the semiconductor manufacturing and related industries.
* SEMATECH- Semiconductor Manufacturing Technology is an association of member companies cooperating pre-competitively in key areas of semiconductor technology with a goal of accelerating development of advanced manufacturing technologies.
* SEMI- Semiconductor Equipment and Materials International is a global trade association that represents the semiconductor and flat panel display equipment and materials industries.
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| **Materials/Specialized Equipment Needed** | * Internet Scavenger Hunt
* Employment Requirements Chart
* Wages and Employment Projections
* Researching Careers in Electronics Vocabulary
* Vocabulary Quiz Key
* Ethics (Computer Usage/Copyright Policy)
* Ethics Quiz Key (Computer Usage/Copyright Policy) Computer Usage Ethics
* Internet Scavenger Hunt handout for each student
* Employment Requirements Chart handout for each student
* Wages and Employment Projections handout for each student
* Researching Careers in Electronics Vocabulary handout for each student
* Vocabulary Quiz for each student
* Ethics (Computer Usage/Copyright Policy)
* Ethics Quiz (Computer Usage/Copyright Policy)
* Computer Lab (one station per student or one station per two students)
* Computer Station for teacher with projector for slide presentation and demonstration
* Whiteboard (or similar setup) for notes/key points
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | Discuss the following statistics with students highlighting the higher reported wages of high-tech employees. The source for information comes from the Bureau of Labor Statistics.* Show and discuss the following chart from the May 2016 National Occupational Employment and Wage Estimates for the United States: [http://www.bls.gov/oes/current/oes\_nat.htm#00-0000.](http://www.bls.gov/oes/current/oes_nat.htm#00-0000)
* Compare the increase in employment for all occupations to the increase in engineering careers.

State the purpose of the lesson, which is to conduct research about employment opportunities and requirements in the electronics field.State that before students can begin research, they must understand and agree to adhere to the ethics associated with computer usage.\*\*If students have already completed a lesson on ethics and computer usage, you can use this information to conduct a brief review of the material before beginning the lesson with “III. Define terms associated with the profession.” |
| **Direct Instruction \*** | I. Define ethics relative to computer usage:A. Distribute and discuss key policy statementsB. Define ethics and stress the importance of ethical computer usageDistribute Ethics (Computer Usage/Copyright Policy) handoutEthics definition- “The professional standards of conduct/behavior” (Webster).II. Discuss appropriate behaviors relative to computerusage ethics:A. Describe theoretical/hypothetical situations and allowstudents to determine whether or not the behaviorswould comply with policy/ethical standardsB. Situation one- A student uses class time tocheck/send/reply to email rather than working on classassignments. (Unethical)C. Situation two- Students download pictures from theInternet to use in class assignments. (Unethical unlessthe students obtain permission to use the images fromthe copyright holder)D. Situation three- A student uses a hyperlink to a websiteduring a class presentation. (Ethical)E. Situation four- Using a school computer, a student goesto a website other than one expressly permitted by theteacher. (Unethical)Create additional theoretical situations as needed to stress computer sage policies during discussion.III. Define terms associated with the profession:A. AssociationsB. Job classifications/descriptions-* Electrical and electronics engineering technicians design, develop, test, and manufacture electrical and electronic equipment.
* Broadcast technicians install, test, repair, set-up, and operate electronic equipment in recording and transmitting information via radio, television, cable, and film.
* Service technicians install, repair, or adjust commercial or consumer electronic equipment.

 (Source- The Science of Electronics: DC/AC)Distribute Researching Careers in Electronics Vocabulary handout.Key Point- These organizations can be excellent sources of information about employment opportunities and trend projections in the electronics field.IV. Identify various sources for obtainingemployment informationA. NewspapersB. Internet• http://online.onetcenter.org/• http://www.occupationalinfo.org/• Various search enginesC. TextbooksD. Trade magazinesV. Conduct keyword and Boolean searches on various searchenginesA. Keyword searches• Place double quotes around a word or phrase• Not impacted by upper or lower-case letters• Keep a record of your keyword search termsB. Boolean searches• A search that uses Boolean logic to narrow the results of the search between two topics (electronics/telecommunications)• Boolean search terms are “and,” “or,” and “not”• Use more than one of the various search engines Example- Use “electronics organizations” instead of electronics organizations Examples-* To find results for both topics, the search would be “electronics” and

“telecommunications”* To find results for one topic or the other, the search would be “electronics” or “telecommunications”
* To find results for one topic but not the other, the search would be

“electronics” not “telecommunications”Tip- Keep a record of the search engines and search terms you have tried.VI. First Internet assignmentA. Internet Scavenger HuntB. Employment Requirements ChartC. Wages and Employment ProjectionsDistribute handouts- Internet Scavenger Hunt Employment Requirements Chart Wages and Employment ProjectionsTeacher models process for answering question one on the Internet Scavenger Hunt as students follow along at their computer stations.VII. What is a skill?A. Soft skills vs. hard skillsB. Self-management skillsThe teacher discusses the importance of these skills in employment in the workplace.VIII. Formal assessmentA. Vocabulary QuizB. Ethics Quiz (Computer Usage/Copyright Policies)Distribute Vocabulary Quiz and Ethics Quiz (Computer Usage/Copyright Policies) and allow time for students to take each quiz. Teacher will grade with quiz keys.*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 \*** | * Teacher models process for opening an Internet browser and typing a URL in the appropriate field.
* Teacher models process for answering question one on the Internet Scavenger Hunt while students follow along at their computer stations.
* Students select and open an Internet browser and type in the suggested URL to obtain information for question two on the Internet Scavenger Hunt.
* Teacher prompts students for correct response to question two and redirects and/or reteaches key concepts as necessary.

*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 \*** | Students complete the remainder of the Internet Scavenger Hunt in class. The teacher will collect this assignment and assess student understanding of concepts related to research procedures/methods based on the accuracy of the student findings.*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** | (To be completed after presentation/demonstration)**Ask-*** What do you think it means to practice ethical behavior?
* What are some examples of ethical behaviors you are expected to demonstrate in the computer lab/classroom?
* What are some examples of unethical behaviors that are considered inappropriate in the computer lab/classroom?
* What is the purpose of a Boolean search? How does the use of Boolean operators assist an individual when conducting research?
* What does CEA stand and for? IEEE? EIA? What is the general purpose of these organizations?
* Where are some sources of information on jobs and employment trend projections?
* What are some of the employment requirements and trend projections you discovered in your research?
* Did the wage statistics you found in your research match your initial ideas about wage possibilities in this field?
* How are the various employment opportunities in the electronics field similar or different from one another?
* Which knowledge, skill, or task requirements found in your research most surprised you? Why?
* What is one new piece of information you have found interesting or helpful as a result of your research?
* How can you use the information from this assignment to help you now?
* How can this activity/assignment benefit you in the future?
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| **Summative/End of Lesson Assessment \***  | **Informal Assessment-**Teacher monitors progress of students working on computers and evaluates understanding of key concepts/policies. Teacher redirects inappropriate behavior or reteaches concepts related to lesson.**Formal Assessment-**1. Evaluate student understanding of computer usage ethics principles using the Ethics Quiz. Keep the Ethics Quiz on file in individual student folders for documentation purposes.
2. Evaluate student understanding of vocabulary using the Vocabulary Quiz.

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*None |
| **References/Resources/****Teacher Preparation** | The teacher should prepare all of the handouts needed for the lesson and should research online high-tech employment and wages in Texas and nationally in order to introduce the lesson.* Buchla, D. and Floyd, T. (2004). *The science of electronics: DC/AC*. Upper Saddle River,
	+ NJ: Prentice Hall.
* O\*NET. (n.d.). Summary report for: 17-3029.02 Electrical Engineering Technologists. In *O\*NET Online*. Retrieved from <http://www.onetonline.org/link/summary/17-3029.02>
* Electronic Industry Associations Sector (n.d.). In *1800miti.com 2013 Commerce* *Directory*.
* Bureau of Labor Statistics. (n.d.). In *United States Department of Labor*. Retrieved from <http://www.bls.gov/>
* Allen, J. M. (n.d.). Copyright and fair use: An issue of ethics in a changing learning environment. In *UNT Digital Library*. Retrieved from University of North Texas Digital Library [http://digital.library.unt.edu/ark:/67531/metadc31081/m1/2/](http://digital.library.unt.edu/ark%3A/67531/metadc31081/m1/2/)
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| **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) | * Research conducted in this lesson will be used in the Writing About Research lesson.
* After completing the required assignments, students can use the Internet to search for career and/or mentorship opportunities within the field of electronics for which they currently qualify.
* At the high school level, students can use research skills in additional career search/exploration scenarios or in other classes where Internet research is a requirement.
* At the post-secondary level, students will be required to use research skills for education and/or when seeking employment.
* These skills will be helpful to promote lifelong learning.
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| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA, 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)