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| **Title** | Constructing a Glider |
| **Introduction** | In this lesson students will use their design information to construct a glider. Students will get an overview of tools, tool safety and construction techniques |
| **Curriculum Alignment** | 8108 Exploring Technology Systems Blueprint  01.01 Explain appropriate lab, classroom, and teaming skills.  005.02 Use computers and other tools of technology in various applications.  007.03 Design and fabricate a transportation vehicle.   |  |  | | --- | --- | | |  | | --- | | [**NT.K-12.5**](http://www.educationworld.com/standards/national/toc/index.shtml#numbers) **TECHNOLOGY RESEARCH TOOLS** | |  * Students use technology to locate, evaluate, and collect information from a variety of sources. * Students use technology tools to process data and report results. * Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. |
| **Learning Outcomes** | Students will be introduced to the tools to be used and be cautioned about safe use of the tools. Students will get an overview of some building techniques (composite, hollow / rib, solid and paper wrap) and experience the construction process.  Students will safely use the provided tools to construct a balsa glider. Students will construct the basic glider and use their design information to construct the wing. |
| **Time Required and Location** | This lesson should take approximately 135 minutes (three 45 minute classes). |
| **Materials Needed** | Snips for cutting balsa wood  Scissors  Balsa wood sticks  Balsa wood sheet  Basic glider drawing (see lesson #3)  White glue  Hot glue guns  Hot glue sticks  Tissue paper  Drawing Paper  Plastic wrap  Wax paper  Aluminum foil  **Technology resources**  Each student should have a computer with internet access. Changes will have to be made to allow them to research wing designs if internet access is not available  Students should have a computer with word processing software. Students can complete this activity with paper and pencil if computer with WP software is not available.  It is suggested that the teacher be able to project the basic glider drawing for all students. |
| **Safety** | Follow typical classroom safety procedures.  Be careful with blades and the hot glue. |
| **Participant Prior Knowledge** | Show students the basic glider drawing by projecting for the class. Review how to determine lengths, widths and depths of parts.  Demonstrate the correct use of each tool provided. Discuss safety concerns (hot glue is hot, snips should be used with caution, etc.) and remind students of your consequence for misusing tools in a harmful manner.  Students should be aware that they will continue keeping a project log. This can be paper and pencil or computer word processing file. Some work with paper and pencil will be required even if the project log is kept electronically. |
| **Facilitator Preparations** | The teacher should start examples of the recommended construction techniques to show students. Check websites to find examples of techniques or create your own design based on your knowledge and research.The teacher should ensure that there is space available for storing the “in progress” work of students. |
| **Participant Prior Knowledge** | Show students the basic glider drawing by projecting for the class. Review how to determine lengths, widths and depths of parts.  Demonstrate the correct use of each tool provided. Discuss safety concerns (hot glue is hot, snips should be used with caution, etc.) and remind students of your consequence for misusing tools in a harmful manner.  Students should be aware that they will continue keeping a project log. This can be paper and pencil or computer word processing file. Some work with paper and pencil will be required even if the project log is kept electronically. |
| **Activities** | Students should search on the internet for construction methods for constructing a balsawood glider. Students should make a list of pros and cons of each method they find and record in their project log. (This activity is about being creative and working through a design process. Check to make sure that students are finding ideas and working to bring those ideas to existence).  Ask students to share the methods they have found along with their findings on how it might be beneficial. As students mention the types you have built as samples show the wings and discuss the process for making along with tools used and safety concerns with those tools.  **Guided Practice** (Second 45 minute section)  Teacher will provide students with tools (see materials list), basic glider drawing (projection) and raw materials (balsawood, paper, etc.). Students will work to create a basic balsa wood glider. Teacher should observe looking for use of construction techniques discussed, design characteristics discussed, etc. For students choosing their own techniques and design ideas discuss with students what they plan to do and how they will accomplish the task to ensure that their idea is feasible.  Check student’s work as they begin measuring parts for the basic glider. Ensure that they are correctly reading the part drawing. Observe tool use to ensure that students are using properly and safely. For any deviation ask students to explain why. As long as safe use of a tool is maintained alternate uses would be acceptable. If alternate use of a tool is allowed make sure that safety issues are addressed. |
| **Assessment** | Students will use tools properly and safely to construct their wing and attach to the basic glider already constructed. Students may make modifications to the basic glider but must document reason and potential benefits of any design changes in their project log. |
| **Modifications** | Make sure that the main glider meets the basics of the basic glider drawing. This can be done by providing student with premade basic glider if necessary.  Students can be paired so that at least one of the students is capable of reading instruct sheet. |
| **Alternative Assessments** | Arrangement can be made for students with special needs to have the directions read to them and to answer the questions orally. |
| **References** | Student Research sites to find images of possible glider designs: Museum of Flight - <http://www.museumofflight.org>Kennedy Composites - <http://www.kennedycomposites.com/organic.htm>Flyby Hangliders - <http://www.flyby-fester.no/sider/HG/HG.htm>Experimental soaring - <http://esoaring.com/steve_arndt_cd.htm>Walkalong History - <http://www.sciencetoymaker.org/tumblewing/peopleHistory.htm>The wings the thing - <http://www.continuo.com/videowebpage/lloydupdate2/photo.htm>Baron’s Hobby - <http://baronshobbies.com/2010/04/jarel-aircraft-design/>Small flying arts - [www.smallflyingartsforum.com](http://www.smallflyingartsforum.com)Air land and sea hobbies - <http://www.airlandseahobbies.com/product/rcpl71002-ep> |
| **Author Info** | Teacher  Russell Sparks  East Wilkes Middle School, Wilkes County Schools  Exploring Technology Grades 6th – 8th  Curriculum  Exploring Technology is an entry level CTE course giving an overview of various areas of technology and careers associated with these areas. The externship involved work in the applied engineering school of Wilkes Community College and local aerospace industries. I was introduced to the tools and concepts used to prepare students for careers in the aerospace industry and given an opportunity to see the industry processes. This will allow me to give my students a better understanding of the steps needed to prepare themselves for the future.  Mentor  Lyndell Duvall  Wilkes Community College  Chair Applied Engineering Technologies, Industrial and Engineering Technology |