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| Teacher Candidate Name: **Abraham Kang** |  | Faculty Advisor: | Rob Williamson |
| Date + Time of demo/class  Blocks: Room: |  | School Advisor: | David Romani |

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| Name + Grade of Course:  **Industrial Design 11** | | Introduction/Rationale:  The cardboard chair project challenges students to design and create a chair prototype that uses only cardboard as a material. The project follows the entire process of design: Research, sketching, drafting, safety, progress records, creating, building, marketing, and re-evaluating the entire process. | Prerequisite Skills:   * Band saw and table saw use * Hand tool use * Orthographic drawing * Sketching * Joinery of cardboard |
| Title of Unit:  **Cardboard Chair** | Length of Unit:  **5 weeks x 70 min classes** |

**Accommodations for Differentiated Instruction:**

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| English Language Learner | Provide texts from language of origin with pictures of tools, machines, equipment and materials. Encourage students to research their tools, machines, equipment and materials using native language sources. Utilize graphic organizers and create the assignment components to reduce text information and increase physical creation. |
| Gifted Student | Additional criteria can be added to challenge students who are gifted. For example, removing the use of glue will result in students having to think creatively in order to join their material. Also, students can assist others who are behind. Students with learning challenges can be assigned partners to reduce the work load. Furthermore, the criteria of the cardboard chair can also be reduced. For example, allowing the use of metal fasteners or wood for added strength. |

**Learning Outcomes:** <https://www.bced.gov.bc.ca/irp/pdfs/applied_skills/1997teched1112_indusdesign.pdf>

**DESIGN AND COMMUNICATION**

*Students learn to solve design problems and communicate design ideas by examining past and present product design.*

***It is expected that students will:***

* describe aesthetic and functional purposes for design elements (line, shape, form, colour, texture) in product and system designs (Concept)
* describe how product and system designs are influenced by specifications (Concept)
* evaluate the effect of a variety of processes, tools, and techniques used to plan, research, and communicate design information and production details (Concept)
* solve design problems using a variety of strategies (Problem Solving)
* assess the appropriateness of design solutions (Problem Solving)
* demonstrate ability to collaborate to analyse and solve design and communication problems (Problem Solving)
* develop and present design solutions (Modifications)
* develop and present design solutions (Modifications)
* select and use materials and components in designs to reflect specific design criteria and community standards (Modifications)
* apply concepts from other disciplines to the design process (Modifications)

**PRODUCT DEVELOPMENT**

*As students work individually and in groups to evaluate the characteristics, properties, and production of existing products, they develop an awareness of materials and processes.*

***It is expected that students will:***

* describe processes and components involved in manufacturing and production (Concepts)
* compare the characteristics and properties of materials used to manufacture or produce products or systems (Concepts)
* describe the forces that act on structures that must be taken into account when designing, manufacturing, or producing products or systems (Concepts)
* identify impacts of production and manufacturing processes on society and the environment (Concepts)
* identify entrepreneurial opportunities in production and manufacturing (Concepts)
* analyse the effect of design elements in a production process (Problem Solving)
* communicate solutions to problems encountered in product development (Problem Solving)
* demonstrate an understanding of the steps involved in managing product development projects (Problem Solving)
* produce finished products or systems from plans or designs (Modifications)
* apply the processes of combining, forming, separating, and finishing (Modifications)
* develop and modify products or systems to address (Modifications)

**ENERGY, POWER AND TRANSPORTATION**

*Students learn how mechanical systems and devices convert, transmit, and use energy.*

***It is expected that students will:***

* use tools and equipment accurately and efficiently to achieve design and assembly specifications (Modifications)
* construct a device or system that is energy efficient (Modifications)

**Length of Unit:** March 23 to April 24, 2015 (Semester school, approximate time needed: 5 weeks, 23 x 70-80 minute class periods)

**Content and approximate Duration:** **The Cardboard Chair unit will begin right after spring break.**

\*Note\* mention project before spring break so student can begin thinking of ideas

**Research (2 Classes)**

**Design Sketches (3 Classes)**

**Orthographic Projections (3 Classes)**

**Prototyping (4 Classes)**

**Final Product Construction (10 Classes)**

**Competition Day (1 Class)**

**Side Project for early finishers**: Curling Crutch, cardboard locker shelf, intramural trophy, 3D game development

|  | ◄ [January](http://www.wincalendar.com/January-Calendar/January-2014-Calendar.html) | **~ February 2015 ~** | | | | | [March](http://www.wincalendar.com/March-Calendar/March-2014-Calendar.html) ► |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Sun** | **Mon** | **Tue** | **Wed** | **Thu** | **Fri** | **Sat** |
|  |  |  |  |  |  |  |  |
| 1 | 1 | 2 Start Practicum | 3 | 5 | 6 | 7 | 8 |
|  | 8 | 9 Family Day | 10 | 11 | 12 | 13 | 14 |
|  | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|  | 22 | 23 | 24 | 25 | 26 | 27 | 28 |

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| ◄ [February](http://www.wincalendar.com/February-Calendar/February-2014-Calendar.html) | **~ March 2015 ~** | | | | | [April](http://www.wincalendar.com/April-Calendar/April-2014-Calendar.html) ► | | |
| **Sun** | **Mon** | **Tue** | **Wed** | **Thu** | **Fri** | **Sat** | | |
|  |  |  |  |  |  |  | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| 8 | 9  SPRING BREAK | 10  SPRING BREAK | 11  SPRING BREAK | 12  SPRING BREAK | 13  SPRING BREAK | 14 | | |
| 15 | 16  SPRING BREAK | 17  SPRING BREAK | 18  SPRING BREAK | 19  SPRING BREAK | 20  SPRING BREAK | 21 | | |
| 22 | 23 Introduction to the Cardboard Chair | 24 Brainstorming exercises | 25 Drawing Techniques and Joining Methods | 26 Design Sketches | 27 Finalize Sketches | 28 | | |
| 29 | 30 Orthographic Projection | 31 Dimensioning |  | | | |  |

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| ◄ [March](http://www.wincalendar.com/March-Calendar/March-2014-Calendar.html) | **~ April 2015 ~** | | | | | | [May](http://www.wincalendar.com/May-Calendar/May-2014-Calendar.html) ► | |  |
| **Sun** | **Mon** | **Tue** | **Wed** | **Thu** | **Fri** | | **Sat** | |  |
|  |  |  | 1 Orthographic drawings Continued | 2 Hand Tool Introductions and Hand Tool Safety Quiz | 3 Good Friday | | 4 | |  |
| 5 EASTER | 6 Easter Monday | 7 Miniature Prototyping | 8 Miniature Prototyping Continued | 9 Work Day | 10 Final Product Construction | | 11 | |  |
| 12 | 13 Table Saw Introductions and Safety | 14 Band Saw Introductions and Safety | 15 Work day | 16 Work day | 17 Work day | | 18 | |  |
| 19 | 20 Introduce Piktochart for Creating an Ad for the Cardboard Chair/Work Day | 21 Work Day/Testing | 22  Finalizing the Final Product | 23 Testing the Final Product | 24  **End of Practicum**  Competition Day | | 25 | |  |
| 26 | 27 | 28 | 29 | 30 NOTES: | |  | |  | |

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| **LESSON TOPIC** | **SPECIFIC LESSON OBJECTIVES (SWBAT)** | **TEACHING METHODS + ACTIVITIES** | **STUDENT ACTIVITIES** | **MATERIALS & RESOURCES** | **ASSESSMENT STRATEGIES + CRITERIA** |
| 1. Introduction to the Cardboard Chair | -Conduct research of various chairs  -Examine the benefits of cardboard  -Recognize the process of design | -Lecture | -Begin research | -Internet connection  -Computers or devices |  |
| 1. Brainstorming exercises | -Create a concept map  -Utilize graphic organizers | -Lecture  -Demo  -Brainstorm activity | -Continue research  -Compose concept maps | -Brainstorm activity  -Internet connection  -Computers or devices | -Concept maps should be at least started |
| 3. Drawing Techniques and Joining Methods | -Explain an isometric drawing  -Illustrate 1 pt. and 2 pt. perspective  -Describe 3 different ways to join cardboard | -Isometric demo  -Perspective demo | -Perspective drawing activities | -Pencils  -Blank paper  -Ruler | -Perspective drawings must be handed in at the end of class |
| 4. Design Sketches | -Illustrate object shading  -Formulate ideas into drawings | -Shading demo  -Lecture | -Design sketches for cardboard chair | -Pencils  -Blank paper | -Design sketches will be due next day |
| 5. Finalize Sketches | -Create sketches depicting different ideas | -Assist students | -Work day  -Progress logs  -Continue | -Pencils  -Blank paper | -Completion mark for completed sketches |
| 6. Orthographic Projection | -Demonstrate how to create an orthographic projection  -Distinguish an object’s front, left and side view | -Lecture  -Orthographic demo | -Decide on which idea they want to choose | -Ruler  -Pencil  -Graph paper | -Ensure students continue to work on progress logs |
| 7. Dimensioning | -Dimension an orthographic drawing | -Dimensioning demo  -Dimension cheat sheet | -Dimensioning activity | -Dimensioning worksheet  -Dimensioning cheat sheet  -Paper  -Pencil | -Dimensioning worksheet due at the end of the class |
| 8. Orthographic drawings Continued | -Translate their design sketches into orthographic drawings  -Draw their cardboard chairs at a correct scale | -Help students with their orthographic drawings | -Work day | -Paper  -Pencil  -Ruler  -Dimensioning cheat sheet | -Short Kahoot quiz on orthographic projections |
| 9. Hand Tool Introductions and Hand Tool Safety Quiz | -Handle and use an X-acto blade safely  -Operate a hot glue gun with care | -Lecture  -Safety demo | -Participate in Safety demos  -Basic hand tool safety quiz | -X acto blades  -Hot glue guns | -Safety quizzes are handed in with a minimum 100% to pass |
| 10. Miniature Prototyping | -Actualize their designs into real life products | -Cardstock cutting demo  -Cardboard joints demo | -Begin constructing miniature prototypes | -10”x10” cardstock for each student plus extras | -Formative group discussion on cardboard joining methods |
| 11. Miniature Prototyping Continued | **-**Apply the discussed joining methods to construct their prototype | **-**Lecture  **-**Monitor students | **-**Students continue working on miniature prototypes |  | -Ensure students continue to work on progress logs |
| 12. Work Day | -Work effectively in a team environment  -Provide feedback to peer’s ideas | -Monitor students  -Facilitate class | -Students catch up on uncompleted work |  | -Classroom progress check by individual assessment |
| 13. Final Product Construction | -Safely use power tools to cut cardboard  -Project their ideas onto a cardboard piece of stock | -Active demo on cardboard breakout | -Begin layout of their cardboard chair  -Cardboard breakout | -Table saw  -Band saw  -Cardboard sheets  -X acto knives |  |
| 14. Table Saw Introductions and Safety | -Safely use a band saw to cut cardboard  -Identify different parts of the table saw | -Table saw safe use demo  -Table saw quiz | -Actively participate in table saw demo | -Table saw  -Two 4’x4’ sheets of cardboard -for each students | -Students must complete the table saw safety quiz with a minimum of 100% in order to pass |
| 15. Band Saw Introductions and Safety | -Safely use a band saw to cut cardboard  -Identify different parts of the band saw | -Band saw safe use demo  -Band saw quiz  -Introduce the cardboard material | -Actively participate in band saw demo | -Band saw  -Scrap material to cut  -Cardboard | -Students must complete the band saw safety quiz with a minimum of 100% in order to pass |
| 16. Work Day | -Communicate with peers and teacher their problems regarding their cardboard chair | -Monitor students  -Ensure clarity with the final product | -Work on their cardboard chair final product | -Table saw  -Band saw  -X acto knives  -Hot glue  -Cardboard sheets |  |
| 17. Work Day | -Work both independently and cooperatively on their projects  -Solve problems using the design process | -Answer student questions  -Help students who are behind | -Work on their cardboard chair final product | -Table saw  -Band saw  -X acto knives  -Hot glue  -Cardboard sheets | **-**Assess student work habits  -Ensure students continue to complete their progress logs |
|  |  |  |  |  |  |
| 18. Work Day | -Identify the significance of cardboard as a material  -Utilize class time effectively | -Lecture  -Monitor students | -Work on their cardboard chair final product | -All previously mentioned tools |  |
| 19. Introduce Piktochart for Creating an Ad for the Cardboard Chair/Work Day | -Create and save a new Piktochart  -Identify the pros and cons of their own final product | -Live demo of Piktochart  -Assist students | -Work on their cardboard chair final product  -Create a Piktochart | -Internet connection  -All previously mentioned tools  -Computers or devices | -Cardboard chair final product and Piktochart chair ad are both due in two days |
| 20. Work Day/Testing | -Complete project  -Test their project and re-evaluate any problems that arise | -Monitor students | -Work on finishing their cardboard chair | -Internet connection  -All previously mentioned tools  -Computers or devices | -Ensure students continue to complete their progress logs |
|  |  |  |  |  |  |
| 21. Finalizing the Final Product | -Complete project  -Ensure all design criteria is met | -Lecture of design criteria | -Work on finishing their cardboard chair  -Go through the checklist of design criteria | -Internet connection  -Computers or devices | -Ensure that students are checking that their projects align with the design criteria |
| 22. Testing the Final Product | -Test their final product to the design criteria | -Monitor students | -Complete project  -Complete testing  -Complete Piktochart | -All previously mentioned tools and resources and materials | -Competition begins next day |
| 23. Competition Day | -Evaluate their peers products based on the design criteria  -Self-assess their own product and reflect on their process | -Evaluate student work  -Decide on three finalist | -Showcase final product and accompanying Piktochart ad | -Design criteria | -Final products will be marked based on rubric  -School Principal will choose the winner |

**Key Vocabulary words: Prototype, design, orthographic, isometric, graphic organizer, marketing, self-assessment, band saw, table saw, Piktochart, ideation sketches, manufacturing, product**

**Evaluation**: **See handout**

**Rubrics: See handout**