

Title: The Manufacturing of a Seated Design

Author: Danielle Piparo Morris

Externship Business: [KI-Bonduel](#)

Overview / Description:

This is a unit about the design and manufacturing of a chair consisting of three lessons. First, students will research the stylistic trends throughout history by exploring a slide show presentation and viewing the Art of Seating from the Museum of Contemporary Art in Jacksonville, Florida. Students will choose a chair from this collection to use as inspiration. They will analyze the style, elements and principles of the design and participate in a discussion on form vs. function. A one-page written paper will be due at the end of this lesson.

Next, students will be tasked with creating an original 2-dimensional design of a chair. Students will have the option of drawing or using Google Sketchup for the design process which will extend over 2 days. The students will continue to be led in discussions related to innovation, form vs. function and other vocabulary will be introduced. Once the designs have been completed, students will write an artist statement for their display.

Lastly, students will learn about the KI company in Bonduel Wisconsin and the process of Lean Manufacturing, particularly cost effectiveness, standard work instructions and quality checks/internal audit. Students will be assigned to work in groups; they will choose one chair design from a group member. Student groups will create a list of materials needed to create the chair and will come up with a list of instructions on how to assemble it. Students will assign a cost value to each material used in the chair design and how much of the material is used. They will figure out the amount of time and resources it would take to create the chair such as wage, manpower, and tools needed. Students will create a chart with this information as they discover what it takes to go from the process of creating design to the manufacturing of the product. Students will then fill out an "internal Audit/quality check" form as their self assessment and reflection of their work and participation in this unit.

Subject(s):

High School Art: Graphic Design

Grade Level(s):

Varied grades 9-12

Learning goals/objectives:

- Students will learn the following vocabulary: constraints, organic, geometric, and scale.
- Students will become familiar with chair design and production such as Lean Manufacturing.
- Students will learn about chairs from the different centuries.
- Students will consider the role of inspiration in the design process.
- Students will consider the use of material as it relates to form and function in design.
- Students will utilize computer applications such as Google Sketchup and Microsoft Word.

Workplace Readiness Skills:

- Social Skills
- Teamwork
- Attitude and Initiative
- Professionalism
- Critical Thinking
- Planning and Organization
- Communication

Type of Activity:

- Individual
- Small Group
- Whole Class

Teaching Strategies:

- Discussion
- Demonstration
- Use of Technology
- Project Based
- Effective questioning
- Self assessment

Content Standards

Model Academic Standards for School Counseling

Academic Development Domain

Content Standard C: Students will understand the relationship of academics to the world of work, and to life at home and in the community.

- Core Performance Standard 1: Understand how to relate school to life experiences.

Career Development Domain

Content Standard G: Students will acquire the self-knowledge necessary to make informed career decisions.

- Core Performance Standard 2: Develop positive interpersonal skills necessary to be effective in the world of work.

Wisconsin's Model Academic Standards for Art and Design Education

Art and Design - Doing

C: VISUAL DESIGN AND PRODUCTION- Content Standard: Students in Wisconsin will design and produce quality original images and objects, such as paintings, sculptures, designed objects, photographs, graphic designs, videos, and computer images.

- C.12.1 Use the elements and principles of design in sophisticated ways
- C.12.2 Understand the procedures of developing quality design
- C.12.4 Use advanced design techniques to improve and/or change artwork
- C.12.5 Analyze the complexities of nature and use challenging artistic images as visual resources
- C.12.6 Experiment visually with sketches for complex solutions involving concepts and symbols
- C.12.7 Apply advanced craft and skills to consistently produce quality art
- C.12.9 Use ongoing reflective strategies to assess and better understand one's work and that of others
- C.12.10 Assume personal responsibility for their learning and the creative process

Art and Design - Understanding

I. PERSONAL AND SOCIAL DEVELOPMENT - Content Standard: Students in Wisconsin will use their senses and emotions through art and design to develop their minds and to improve social relationships.

- I.12.5 Understand and recognize that art reflects the history and culture in which it was created
- I.12.7 Work independently, collaboratively, and with deep concentration when creating works of art.

Length of Time and length of class periods:

- Lesson one: Stylistic Trends and the history of the Chair, 1-2 class periods - 1hr. 20min. each.
- Lesson Two: Innovative Chair Design, 1-2 class periods - 1hr. 20 min. each.
- Lesson Three: Manufacturing your Chair, 1-2 class periods - 1hr. 20 min. each.

Materials List:

Lesson One:

- <http://driehausmuseum.org/exhibition/art-of-seating/exhibition-overview>
- <http://www.artsandartists.org/exhibitions/available-theartofseating/>
- Slide presentation:
 - Stylistic Trends and the History of the Chair Slidedeck:
<https://drive.google.com/a/cesa8.org/file/d/12scXDZJWvkOh4vmy2hSAI13KCtWZtAeN/view?usp=sharing>
 - The History of the Chair Slide Presentation Notes and Discussion points:
https://drive.google.com/a/cesa8.org/file/d/1YvaMNHIs4bUhs_0heZq1djinJX7aoTx1A/view?usp=sharing

- History of the Chair Writing Assignment Rubric:
<https://drive.google.com/a/cesa8.org/file/d/1IENEqP5XtTAVvMTISVha9ozru1zG6eU-/view?usp=sharing>

Lesson Two:

- Innovative Chair Design handout:
<https://drive.google.com/a/cesa8.org/file/d/1HLDmSLBFsLIV7gCbPK6rXfpqf8FPudWf/view?usp=sharing>
- Sketchup Tutorial: <https://www.youtube.com/watch?v=umuE8qLaKYg>

Lesson Three:

- Handout: [Lean Manufacturing](https://www.ki.com/) (KI Furniture Company) <https://www.ki.com/>
- The Costs of Manufacturing handout:
<https://drive.google.com/a/cesa8.org/file/d/1CD-Gy3McR6PjJQ-YyAEEFg-xVjWrlXVg/view?usp=sharing>
- My Internal Audit/Quality Control:
https://drive.google.com/a/cesa8.org/file/d/1hEOT9_GavhitiVC37fX7C3HEr-I5qBPz/view?usp=sharing

Directions (Step-by-Step):

Lesson one: Stylistic Trends and the history of the Chair

1. Review overview and objectives of lesson (as stated above)

2. Discussion:

Using a classroom chair as an example, ask students to compare its design to their own bodies. What are the similarities? What are the differences? The relationship between the human form and that of the chair requires careful consideration. Like the human body, chairs have arms, legs, and a back. But not all chairs look and work the same way.

3. Brainstorm:

Have your students give examples of the different kinds of seating they encounter during the course of a given day and record their responses on the board. Is there something that all these different types of seating have in common?

Ask your students if they have a favorite chair. What is their favorite aspect of the design? The way it looks? Works? There are many factors that must be considered in the design of a chair. The designer must consider who will be using it, and where. In some cases, such as a seat on an airplane, there might not be one specific user. In other cases, the chair might be designed for a single user: a custom wheelchair, for example. Each chair has its own set of criteria, or constraints, that govern the process of its design - Form vs. Function.

4. Image based Discussion/ Slide presentation:

<https://drive.google.com/a/cesa8.org/file/d/12scXDZJWvkOh4vmy2hSAI13KCtWZtAeN/view?usp=sharing>

Students should consider the questions on the attached handout while discussing each image.

https://drive.google.com/a/cesa8.org/file/d/1YvaMNHIs4bUhs_0heZq1djnJX7aoTx1A/view?usp=sharing

5. Writing Assignment

Students will use the handout and the notes taken from the slide show to choose one style of chair to research further, write about, and use as inspiration for their original design. Ask students to find an image of a chair in the style they choose to print and hand in with their

<https://drive.google.com/a/cesa8.org/file/d/1IENEqP5XtTAVvMTISVha9ozru1zG6eU-/view?usp=sharing>

Lesson Two: Innovative Chair Design

1. Review Overview and expectations.

2. Discussion:

Think about a chairs you saw yesterday in the slide show. It might be hard to imagine that engineers are still designing chairs considering how long they've been around, what advances in science and medicine has lead to the new improvements in chair design? "Ergonomic Technology". Let's review the many different uses of a chair. Brainstorm list - possibilities include high chair, wheelchair, doctor's chair, dentist's chair, hairdresser chair, lounge chair, office chair etc..

3. Planning

Using the inspiration and the research students did yesterday, they should answer the following questions before beginning sketches:

- Where will the chair be located? (kitchen/doctor's office)
- How often will the chair be used? (3 x day/all day)
- Will people be doing anything else as they sit in the chair? (eating/reading)
- Will this chair get dirty often? (yes/hopefully not)
- Who will use the chair? What are the physical characteristics of the user(s)? (under 30 pounds/possibly hundreds of pounds)

4: Studio design/work time:

Introduction and demonstration of studio processes such as 2pt. Perspective in drawing and computer application Google Sketchup <https://www.youtube.com/watch?v=umuE8qLaKYg> (allow students 15 minutes to explore and play around with Google Sketchup before beginning their sketch).

Students will use the attached handout/rubric to complete the visual design of the chair.

<https://drive.google.com/a/cesa8.org/file/d/1HLDmSLBFsLIV7gCbPK6rXfpqf8FPudWf/view?usp=sharing>

Lesson Three: Planning to Manufacture

1. Review overview and objectives.

2. Discussion: Read the handout [“Lean Manufacturing”](#) from the KI company.

Discuss what the purpose of lean manufacturing is “Simply, lean means creating more value for customers with fewer resources. A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste.” Ask the students if they have any experience in Lean manufacturing. Ask the students to discuss the production process--”There are three types of industrial production methods: One-off production is when only one product is made at a time; Batch production is when a small quantity of identical products are made; Mass production is when hundreds of identical products are made, usually on a production line.”

3. Assignment:

Have students break up into groups of three and pass out the assignment sheet. Read out loud as a class and review examples and demonstration. Students should then begin work on completing the assignment. They will start with creating a the step-by-step instruction guide/ booklet which can include visual images. Then they will figure out the costs of manufacturing and create charts using Microsoft word to show their work. Students will use the attached handout for instruction.

<https://drive.google.com/a/cesa8.org/file/d/1CD-Gy3McR6PjJQ-YyAEEFg-xVjWrlXVg/view?usp=sharing>

4. Audit:

Students will individually fill out the Internal Audit/Quality check as their final self assessment and reflection of their work and participation.

https://drive.google.com/a/cesa8.org/file/d/1hEOT9_GavhitiVC37fX7C3HEr-I5qBPz/view?usp=sharing

Vocabulary/Definitions

- **Form vs. Function** - is a principle associated with 20th-century modernist architecture and industrial design which says that the shape of a building or object should primarily relate to its intended function or purpose.
- **Modern Art Era** - Modern art includes artistic work produced during the period extending roughly from the 1860s to the 1970s, and denotes the styles and philosophy of the art produced during that era. The term is usually associated with art in which the traditions of the past have been thrown aside in a spirit of experimentation.
- **Ergonomic technology** - Embracing advancements in ergonomic technology is an essential part of office design. Seating should be seen as an investment that leads to enhanced productivity, better health and happier workers.
- **Lean Manufacturing** - often simply "lean", is a systematic method for waste minimization ("Muda") within a manufacturing system without sacrificing productivity.
- **Audit**- an official inspection of an individual's or organization's accounts, typically by an independent body.

- **Quality Control** - procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements.

Wrap-Up:

Students will work in their assigned groups to present all of their work to the rest of the class. They will include their individual research and drawings, their instruction booklets, their manufacturing costs and lastly, they will share a finding from their reflection/audit. Students will display their work as part of a posterboard or Powerpoint. Other students will have an opportunity to ask questions and give feedback.

FormativeAssessment:

Writing assignment, slide show notes, guidebook. (see all attached worksheets and rubrics).

Summative Assessment:

Student Artwork, Data Chart and Final Presentation (rubrics attached)

Extension Activity for differentiation:

Differentiation will take place by giving students choices and the freedom to expand their knowledge with the art materials and technology tools made available to them. For example, designing by hand or using computer applications, presenting with a poster or Powerpoint etc. IEP's will be followed and additional adaptations will be made when necessary.

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