

Lesson Overview

Lesson Title:

Designing a Functional and Aesthetic Desk Organizer

Grade Level:

Grade 7/8

Duration:

5 Class Periods (60 minutes each)

Subject Areas:

- Visual Arts
- Mathematics
- Science and Technology
- Language Arts (Optional for written components)

Lesson Type:

Problem-Based Learning (PBL)

Curriculum Expectations

Grade 7 Curriculum Expectations

- **Mathematics:**
 - **E1.4:** Apply knowledge of 3D shapes to create designs using complex geometric properties.
 - **E2.1:** Apply knowledge of area and surface area in real-world design challenges.
- **Science (Strand A - STEM Skills and Connections):**
 - **A1.2:** Investigate how technology can be used to improve the design and function of systems and structures.
- **Science (Strand D - Form, Function, and Design of Structures):**
 - **D2.2:** Describe how the center of gravity affects stability in structures.
 - **D2.7:** Describe methods engineers use to assess and improve the safety of structures.
- **Visual Arts:**
 - **D1.4:** Use a variety of tools to solve increasingly complex design challenges, including sculpture and mixed media.

Grade 8 Curriculum Expectations

- **Mathematics:**
 - **E1.2:** Create and evaluate complex 3D objects, understanding the geometric principles behind the designs.
 - **E2.2:** Solve advanced problems involving volume and surface area of composite objects in real-world contexts.
 - **Science (Strand A - STEM Skills and Connections):**
 - **A1.3:** Use a variety of technological tools to create and test systems that solve design problems.
 - **Science (Strand D - Structures and Mechanisms):**
 - **D2.2:** Design and build complex systems and analyze their effectiveness in addressing specific design challenges.
 - **Visual Arts:**
 - **D1.1:** Create art that expresses multiple perspectives using various materials and technologies.
 - **D1.4:** Use advanced design principles and multimedia tools to create complex artworks.
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Learning Goals

- Students will understand and apply the design process to create a functional and aesthetically pleasing desk organizer.
 - Students will conduct research to inform their design choices and understand user needs.
 - Students will create detailed orthographic and isometric sketches of their designs.
 - Students will use CAD software (Tinkercad) to develop 3D models of their designs.
 - Students will engage in peer review to provide and receive constructive feedback.
 - Students will reflect on their design process and make informed improvements to their work.
 - Students will present and communicate their design ideas effectively.
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Success Criteria

- **Research:** I can research and analyze existing desk organizers to inform my design choices.
- **Design Sketches:** I can create clear and accurate orthographic and isometric sketches of my desk organizer design.
- **3D Modeling:** I can use Tinkercad to develop a precise 3D model of my desk organizer.

- **Functionality:** My design effectively meets identified user needs and is stable and functional.
 - **Aesthetics:** My design incorporates principles of design to create an appealing and cohesive look.
 - **Peer Review:** I can provide constructive feedback to my peers and use feedback received to improve my design.
 - **Reflection:** I can thoughtfully reflect on my design process and articulate what I have learned and how I have improved.
 - **Presentation:** I can effectively present and explain my design process and final product to the class.
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Materials and Resources

- **Technology:**
 - Computers with internet access
 - Tinkercad accounts for each student
 - Projector and screen for presentations
 - **Materials:**
 - Research Graphic Organizer (previously created)
 - Design Sketching Paper (graph paper and plain paper)
 - Drawing tools (pencils, rulers, erasers, colored pencils)
 - Peer Review Activity Sheet
 - Reflection Graphic Organizer
 - Examples of existing desk organizers (physical or images)
 - **Software/Applications:**
 - Microsoft Word or Google Docs for organizing and writing reports
 - Tinkercad for 3D modeling
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Instructional Plan

Day 1: Introduction and Research

Minds On (10 minutes)

- **Activity:**
 - Display various images of desk organizers and engage students in a discussion about their purposes, designs, and functionality.
 - **Guiding Questions:**
 - What makes a desk organizer effective?

- How do different designs serve different needs?
- What materials and shapes are commonly used?

Action (40 minutes)

- **Research Activity:**
 - Distribute the **Research Graphic Organizer** to students.
 - Students will use computers to research different types of desk organizers, focusing on design features, user needs, materials, and environmental considerations.
 - Encourage students to look for innovative and diverse designs.
 - Students fill out their graphic organizers with findings.

Consolidation (10 minutes)

- **Sharing Insights:**
 - In pairs, students share their most interesting findings and discuss how these might influence their own designs.
 - Select a few pairs to share insights with the whole class.
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Day 2: Designing and Sketching

Minds On (5 minutes)

- **Recap:**
 - Briefly review key takeaways from the previous day's research.
 - Discuss how research informs the design process.

Action (50 minutes)

- **Design Concept Development:**
 - Students begin brainstorming ideas for their own desk organizer designs based on their research.
 - **Sketching Activity:**
 - Introduce students to orthographic and isometric drawing techniques.
 - Demonstrate how to create accurate and detailed sketches.
 - Students use sketching paper and drawing tools to create initial designs, including multiple views (front, side, top, and 3D perspective).
 - Encourage students to annotate their sketches with dimensions and notes about materials and features.

Consolidation (5 minutes)

- **Gallery Walk Setup:**

- Prepare for a gallery walk in the next session by instructing students to finalize their sketches and be ready to display them.
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Day 3: Peer Review and Feedback

Minds On (10 minutes)

- **Introduction to Peer Review:**
 - Discuss the importance of feedback in the design process.
 - Explain how to give constructive and respectful feedback.

Action (40 minutes)

- **Gallery Walk and Peer Review:**
 - Display all student sketches around the classroom.
 - Distribute the **Peer Review Activity Sheet** to each student.
 - Students circulate the room, reviewing at least three peers' designs and providing written feedback on their sheets.
 - After the activity, students return to their own designs and read the feedback provided.

Consolidation (10 minutes)

- **Reflection Discussion:**
 - In small groups, students discuss the feedback they received and potential changes they could make to their designs.
 - Whole-class discussion on common themes and insights from the peer review process.
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Day 4: Refinement and 3D Modeling

Minds On (5 minutes)

- **Recap:**
 - Discuss how feedback can lead to design improvements.
 - Share examples of how professional designers iterate on their work.

Action (50 minutes)

- **Design Refinement:**
 - Students use peer feedback to refine and improve their sketches.
 - **Introduction to Tinkercad:**

- Provide a brief tutorial on using Tinkercad for 3D modeling.
 - Highlight key features and tools relevant to creating their desk organizer designs.
- **3D Modeling Activity:**
 - Students begin creating digital 3D models of their refined designs using Tinkercad.
 - Encourage attention to detail and accuracy in translating sketches to digital models.
 - Teacher circulates to provide assistance and guidance as needed.

Consolidation (5 minutes)

- **Progress Check:**
 - Students save their work and briefly share their progress with a partner.
 - Discuss any challenges encountered and solutions found.
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Day 5: Writing the Research Report

Minds On (5 minutes)

- **Introduction to Writing:**
 - Explain the purpose of the research report and how it will document the design process from start to finish.
 - Discuss the importance of clear communication and organization in writing.

Action (45 minutes)

- **Writing the Research Report:**
 - Distribute the **Simple Research Report Graphic Organizer** to help students structure their reports.
 - Students use their research, design sketches, and peer feedback to write a detailed report covering three main paragraphs:
 1. **The Story of Your Design:** Describe the initial inspiration and research that informed the design.
 2. **Peer Feedback and Design Adjustments:** Summarize feedback received and changes made.
 3. **The Final Product:** Discuss the final design, how it evolved, and what the student is proud of.
 - Teacher provides support, answering questions and guiding students through the writing process.

Consolidation (10 minutes)

- **Peer Review of Reports:**

- If time permits, students exchange reports with a peer for a quick review, focusing on clarity and completeness.
 - Students make final revisions based on peer feedback.
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Day 6: Reflection and Final Thoughts

Minds On (5 minutes)

- **Introduction to Reflection:**
 - Discuss the importance of reflecting on the learning process and how it can lead to growth and improvement in future projects.

Action (45 minutes)

- **Reflection Activity:**
 - Distribute the **Reflection Graphic Organizer**.
 - Students use the organizer to reflect on various aspects of the project:
 - **Analyzing Feedback:** How did peer feedback influence their design?
 - **Planning Changes:** What changes did they make and why?
 - **Design Process Insights:** What did they learn about the design process?
 - **Learning and Growth:** What skills or knowledge did they develop?
 - **Final Thoughts:** Overall reflections on the project and their final design.
 - Teacher circulates to support students as they complete their reflections.

Consolidation (10 minutes)

- **Sharing Reflections:**
 - In small groups or as a class, students share key insights from their reflections.
 - Discuss common themes and lessons learned from the project.
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Assessment and Evaluation

Formative Assessment:

- **Observations and Anecdotal Notes:**
 - Throughout the lessons, observe student engagement, collaboration, and application of skills.
- **Research Graphic Organizer:**
 - Review for completeness and depth of research.
- **Design Sketches:**
 - Provide feedback on accuracy, detail, and creativity.

- **Peer Review Activity Sheet:**
 - Assess the quality and constructiveness of feedback given and received.
- **Reflection Graphic Organizer:**
 - Evaluate the depth of reflection and ability to articulate learning and growth.

Summative Assessment:

- **Final 3D Model:**
 - Assess based on criteria such as functionality, stability, aesthetics, and adherence to design principles.
- **Research Report:**
 - Evaluate clarity, organization, and ability to document the design process and decisions made.
- **Overall Process:**
 - Consider the student's engagement and progression throughout the project, including responsiveness to feedback and problem-solving abilities.

Assessment Tools:

- [Single Point Rubric](#)
 - [Educator Version](#)
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Differentiation and Accommodations

- **Content:**
 - Provide various examples and resources to cater to different learning styles (visual, auditory, kinesthetic).
 - Allow students to choose user groups or themes that interest them for their designs.
- **Process:**
 - Offer additional support and scaffolding for students who need it, such as step-by-step guides or peer tutoring.
 - Allow advanced students to explore more complex design features or additional software tools.
- **Product:**
 - Accept different formats for presentations (live, recorded, written reports) based on student comfort and ability.
 - Provide options for students to create physical prototypes if resources and time permit.
- **Environment:**
 - Arrange the classroom to facilitate collaboration and easy movement during activities like gallery walks.

- Ensure access to necessary technology and provide alternatives if needed (e.g., drawing designs by hand if computer access is limited).
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Resources and References

- **Online Tutorials:**
 - Tinkercad official tutorials and guides.
 - **Design References:**
 - Websites and books on product design and ergonomics.
 - **Environmental Resources:**
 - Articles on sustainable materials and eco-friendly design practices.
 - **Curriculum Documents:**
 - Ontario Curriculum for Visual Arts, Mathematics, and Science and Technology.
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Reflection and Next Steps

- **Teacher Reflection:**
 - After the lesson series, reflect on what worked well and what could be improved.
 - Gather student feedback on the project and use it to inform future lessons.
- **Student Extension:**
 - Encourage interested students to further develop their designs or explore other design challenges.
 - Consider opportunities for showcasing student work, such as school displays or online portfolios.