Lillabo Train Set Piece

Year 10 Design and Technology

Timing

9 Weeks

Focus area of design

Accessory

Classroom Resources

Sample folio document
CAD Software
3D Printer
Lillabo Train Set Pieces
Workshop measurement tools
Student laptop and internet access
Sample Budget/Profitability Sheet
Solid Edge Tutorial Sheet

Unit Description

Students consider the IKEA Lillabo Train Set and develop an appropriate extension piece, taking into consideration factors such as target market, environmental issues, current trends and the impact of design. Through the production of a 3D printed model of their chosen design solution, students will develop CAD and CAM skills and an awareness of the considerations made when utilising these techniques.

Outcomes

DT5-2	applies and justifies an appropriate process of design when developing design ideas and solutions
DT5-3	evaluates and explains the impact of past, current and emerging technologies on the individual, society and environments
DT5-4	analyses the work and responsibilities of designers and the factors affecting their work
DT5-5	evaluates designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design
DT5-6	develops and evaluates innovative, enterprising and creative design ideas and solutions
DT5-7	uses appropriate techniques when communicating design ideas and solutions to a range of audiences

Assessment Overview (30%)

Summative assessment of the Design Folio and Design Project will be undertaken. Opportunities for Formative assessment exist during class discussions, case studies, idea generation and manufacturing activities.

Project Overview

Students produce a model extension piece for the Lillabo Train Set. The model will be produced using Solid Edge CADCAM software and then 3D printed using the UPBox+ or UP300. Students will produce a folio to document their progress and decision making throughout the design process and will then test their designs at the conclusion of the project for the purpose of a peer evaluation.

Cross-curriculum content

- ☒ Information and Communication Technologies
- ☒ Work Employment and Enterprise
- ☐ Aboriginal and Indigenous
- ☒ Civics and citizenship
- ☐ Difference and Diversity
- ☒ Environment
- ☒ Gender
- ☒ Literacy
- ☐ Multicultural
- ☒ Numeracy

Key competencies

- ☒ collecting, analysing and organising information
- ☒ communicating ideas and information
- ☒ planning and organising activities
- ☒ working with others
- ☒ solving problems
- ☒ using mathematical ideas and techniques
- ☒ using technologies

Outcome.	Content	Integrated learning experiences, instruction and assessment:	Resources
DT5-2 DT5-3 DT5-6	**Identification of needs and opportunities** Students: • Identify opportunities for new and better solutions • Consider the requirements of end users and stakeholders • Establish and document the requirements and design consideration for a design project • Evaluate the quality of a design solution against criteria for success	**Project Proposal Phase** *Focus Question: What does the design process look like in a commercial environment?* Introduce students to the IKEA Lillabo Train Set and allow time for students to engage with the set as a potential user / customer. Discuss the target market for the set and brainstorm reasons for some of the design decisions evident; - why is the set modular? - why is the set not powered? - why are some pieces two sided? - how many ways can the set be constructed? Measure the critical dimensions of the Lillabo Train Set Pieces and discuss potential margin of error. Establish consistent dimensions for class to refer to during design of Extension piece. Investigate IKEA design and manufacturing processes and explore costs and benefits of low-cost toy manufacturing. Document findings in the form of an infographic. Investigate past and current train set designs and compare the designs by documenting the similarities and differences. Read the IKEA Product Description of the Lillabo Train Set and develop a SWOT analysis to determine the Strengths, Weaknesses, Opportunities and Threats affecting the Set. Establish a Design Brief for the design and construction of an eco-friendly extension for the Lillabo Train Set.	IKEA Lillabo Train Set pieces. Train Set measurement handout: Link IKEA manufacturing websites: • Link • Link IKEA product description of Lillabo Train Set: Link Sample Folio Document: Link Cambridge Stage 5 Design and Technology Textbook - Chapter 2 Developing design ideas and solutions.

Outcome.	Content	Integrated learning experiences, instruction and assessment:	Resources

DT5-3
 	
DT5-4
	Management
	Students:
	• Implement and evaluate a process of design, for example:
	  o Prepare and implement time and action plans for design projects
	• Calculate financial costs of design projects
	• Manage materials, tools and techniques when developing a design project
	• Evaluate the role of project management when developing a design project
	• Maintain a safe work environment when producing a design project, for example,
	  o Use personal protective equipment (PPE)
	  o Identify and respond to warning and safety signage
	  o Adhere to exclusion zones in workshops
	  o Implement risk management strategies and practices
		Project Management Phase
		Focus Question: How does design as an enterprising activity impact upon the designer?
		
		Investigate and estimate the cost of producing the Lillabo Train Set and produce a proposed *profitability analysis* for the Set.
		
		Discuss the impacts of increased costs, such as labour, materials, shipping, distribution and taxes upon the viability of the Set for IKEA.
		
		Investigate working conditions in IKEA factories and/or stores and prepare a report based upon findings, identifying workplace legislation in Australia that would relate to the issues identified.
		
		Establish a budget for the Lillabo Train Set Extension and identify and describe factors such as size, quality, trends and time in relation to the design project.
		
		Discuss and establish a range of criteria to evaluate the success of the Lillabo Train Set Extension, taking into account ethical and environmental factors, and determine methods to measure the level of success achieved for each.
		
		Investigate the short-term and long-term environmental impacts of various 3D printer filaments and determine the cost of materials and resources required to 3D print the IKEA Train Set Extension.
			Profitability analysis template:
			Link
			
			Articles relating to working conditions in IKEA factories/stores:
			Link
			Link
			Link
			
			Sample finance plan:
			Link
			
			Info relating to 3D Printer filament:
			Link
			
			Cambridge Stage 5 Design and Technology Textbook -
			Chapter 3 The impact of past, current and emerging technologies.

Outcome.	Content	Integrated learning experiences, instruction and assessment:	Resources
DT5-6	**Creative and innovative idea-generation** Students: • Generate ideas, research solutions and employ collaborative techniques when developing creative design ideas, e.g.: o Use cognitive thinking tools, e.g. mind maps, concept sketches, SWOT analysis o Undertake primary and secondary research o Work collaboratively and share ideas o Develop models and prototypes of design solutions • Apply design thinking when developing and producing design projects for preferred futures • Develop criteria for success for design projects	**Project Development Phase** *Focus Question: What does it mean to be a responsible designer?* Investigate the trend of eco-friendly toys and discuss the reasons for their development and success. Watch Abstract: The Art of Design (Cas Holman: Design for Play) and reflect upon the design decisions made and products produced within a Design Journal. Develop a Mission Statement, Vision and set of Values for a proposed future designer / manufacturer of children's toys. Develop a concept board to explore sources of inspiration for the development of the Lillabo Train Set Extension project. Generate and sketch a range of ideas for the Extension project. In groups, peer evaluate initial ideas by discussing positive features and possible improvements (Plus / Delta) based upon criteria to evaluate success. Complete Solid Edge Tutorials as required to develop skills in CAD. Develop a CAD prototype of final design of Extension project using Solid Edge. Preview design in 3D printer software (UpStudio) to determine weight of filament required. Develop a profitability analysis for the Lillabo Train Set Piece Extension and evaluate the design to determine opportunities for cost savings.	Eco-friendly toys article: Link The Art of Design (Cas Holman) Video: Link Solid Edge Video Tutorials workbook: Link 3D Printer and Software for product prototyping and printing. Profitability analysis template: Link Cambridge Stage 5 Design and Technology Textbook - Chapter 5 Appropriate technology and ethical and responsible design.
DT5-5	**Research and exploration** Students: • Access, identify and summarise information and data, e.g.: o Spreadsheets o Websites, e.g. Australian Bureau of Statistics o Databases • Interpret and manipulate data to aid the development of design ideas • Research appropriate materials, process and production methods for design projects • Apply and communicate research findings to design projects • Analyse the social, financial and environmental impact of design projects.		

Outcome.	Content	Integrated learning experiences, instruction and assessment:	Resources
DT5-5 DT5-6	**Experimentation** Students: • Undertake tests and experiments to develop design ideas • Assess the suitability of design ideas by testing and experimenting • Refine ideas to address needs and opportunities • Experiment to optimise solutions for design projects, e.g.: o Prototypes o Develop models using software	Experiment with changes and adjustments to design to determine most cost-effective solution. Communicate results of experimentation and testing to justify final design solution. Demonstrate the operation of the 3D printer to produce final Train Set Extension design. Test the function, appearance and suitability of design.	
DT5-7	**Communication and presentation techniques** Students: • Develop arrange of appropriate techniques to communicate and present design ideas to a targeted audience, e.g.: o Communicate research findings and design ideas in visual, graphical, written, oral or digital forms o Create spreadsheets and databases to interpret and manipulate data o Develop models or protypes to communicate design ideas and solutions o Develop, present and justify a marketing strategy for the design solution • Design and produce solutions using ICT as appropriate, e.g.: o Employ desktop publishing software and multimedia applications to document the process o Use web based tools to collaborate on design projects	**Project Realisation Phase** *Focus Question: What role does communication play in successful design?* Demonstrate the features of Solid Edge required to produce a range of formal and 3D pictorial versions of the final design. Communicate an orthogonal and isometric version in Folio. Demonstrate a range of advertising posters for similar products / toys. List the features and characteristics of each, e.g., type of images, uses of font/text, links to target market, etc. Utilise desktop publishing software (such as Adobe Photoshop or InDesign) to produce an advertising poster for the Train Set Extension.	Sample Advertising Posters: Link Adobe Photoshop Tutorials: Link Adobe InDesign Poster Design Tutorial: Link Cambridge Stage 5 Design and Technology Textbook - Chapter 7 Appropriate techniques.

Outcome.	Content	Integrated learning experiences, instruction and assessment:	Resources
DT5-6	**Evaluating** Students: • document and evaluate design processes • justify and document decisions made during development of design projects • self-assess and peer assess design processes and solutions • evaluate the short and long tern consequences of design projects on the individual, society and the environment	**Project Evaluation Phase** *Focus Question: How do we measure the success of a commercial design?* Apply the determined criteria to evaluate success to the development of a Target Market Survey. Students engage with the Lillabo Train Set and Extension pieces and peer evaluate each design, completing the Target Market Survey for each piece. Students reflect upon the performance of their design, the design process and their personal achievement throughout the project and present their findings within the Folio.	IKEA Lillabo Train Set pieces. Cambridge Stage 5 Design and Technology Textbook - Chapter 10 Selecting and using a range of technologies.

UNIT EVALUATION

Class	Teacher Code	Start Date	End Date	Were all outcomes, content & skills taught? *(if no, please specify)*	Evaluation *Were any significant changes made to the planned teaching and learning program, such as a change to the scope and sequence or parts of the program not covered?*

Unit	*Lillabo Train Set Extension*	Class	10 Design and Technology
Dates		Teacher	

Teaching of the Unit

Were all the outcomes and dot points including any skills in the unit covered? If not, please specify.
There were

List any strategies or adjustments you made to meet the learning needs of students with a disability and those across a variety of student backgrounds and learning profiles, including Aboriginal and Torres Strait Islander students. *List individual students and corresponding frequency and type of adjustments.* This data may be collected for NCCD.

Do you have any other comments on your teaching of the unit?

Evaluation of the Unit

Were the teaching strategies (incl. differentiation), ICT, activities and resources in the program relevant and varied? Give specifics.

Did the Assessment *for, of and as* learning task reliably and appropriately assess learning and inform teaching? Explain.
Click here to enter text.

Evaluation of the Unit

Do you have any comments on how this unit could be improved? Consider timing, sequence, additional resources, ICT, teaching strategies, Ad Altissima (extension) and Remediation.
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