Prince William School
Product Design Curriculum Overview

Why teach Product Design?

"Good design, is design that does not become obsolete
Raymond Loewy (1979)

Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens.

Design and Technology is a subject that brings learning to life, requiring learners to apply their learning to real-life situations. Product Design aims to relate authentic real-world awareness of iterative design practices and strategies used by the creative, engineering and manufacturing industries. Learners will be required to use critical thinking, leading towards invention and design innovation, to design and make prototypes that solve real and relevant problems.

Learning for Life and Careers

Employability skills

Literacy, Numeracy/ICT, Research, Analysis, Creativity, Leadership, Organisation, Resilience, Initiative, Communication, Presentation and Collaborative Teamwork.

Linking the curriculum to careers:

Clear Career links following designer, artist case studies are regularly presented

Encounters with employers

Visits are organised for all year groups within the Art, Design and Technology department that have previously included Amazon, Victoria and Albert Museum, Big Bang Fair, Riverford Organic Farm, Henry Moore Foundation.

Our strong links with Oundle school welcomes our student to participate in Life drawing classes, creative workshops of print and 3D works.

Examples of qualification pathways

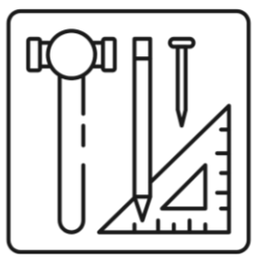
Many of our KS5 students have gone on to study engineering related degrees at university. Product Design can lead to a multitude of further education options such as apprenticeships, engineering, architecture and other design-related degrees

Substantive Big Ideas

- User Needs
- Design Communication
- Material Properties
- Health & Safety
- Tools & Equipment
- Sustainable Design
- Design Feasibility

Disciplinary Big Ideas

Explore
- Plan
- Research
- Generate Ideas



Create
- Prepare
- Process
- Manufacture

Evaluate
- Feedback
- Iteration
- Assessment

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Product Design Curriculum Map – Projects & Topics

	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
	10 x 100 minute lessons per academic year	19 x 100 minute lessons per academic year	10 x 100 minute lessons per academic year	57 x 100 minute lessons per academic year	57 x 100 minute lessons per academic year	95 x 100 minute lessons per academic year	114 x 100 minute lessons per academic year
Topics Covered	**Bee & Bug House:** • Health & safety • Sustainability • Softwood • Hardwood • Manufactured wood • Isometric drawing • Perspective drawing • Logo design • Packaging design • Computer aided design • Typography • Graphic communication	**Acrylic Clock:** • Design movements • Polymers • Thermoset plastic • Thermoplastics • Acrylic cutting • Line bending • Sustainability **Mono Amplifier:** • Electrical components • Design movements • Sustainability • Upcycling • Manufacturing with cardboard	**Electronic Buzzer Game:** • Sustainability • Softwood • Hardwood • Manufactured wood • Electronics • Upcycling • Inclusive design	**Acrylic Phone Holder:** • Polymers • Sustainability • Iterative design • Line bending • Iterative design • Manufacturing proces ses & techniques **Metal Bottle Opener:** • Metals • Idea generation • Iterative design • Anthropometrics • Ergonomics **LED Christmas Tree:** • Electronics • Soldering • Components used **Wood Pull Along Toy:** • Timbers • Cams • Motions • Linkages • Gears • Levers **GCSE N.E.A:** • Investigation of contextual challenges • Design brief	**GCSE N.E.A:** • User needs • Stakeholders • Existing product research • Exploration of materials • Technical specification • Generation of ideas • Design development • Critical thinking • Prototyping • Plan of manufacture • Feasibility of design solution • Critical evaluation	**Deck Chair:** • Exploration of materials • Wood • Textiles • Specialist machinery • Industrial processes • Scales of manufacture **Silver Ring:** • Generation of ideas • Design development • Metals • Brass / silver • Specialist techniques • Specialist machinery **Chocolate Box** • Papers & Boards • Logo design • Polymers • Vacuum forming • Brand identity • Marketing • Industry & enterprise **Lamp:** • CAD • CAM • Prototyping • Cardboard modelling • Specialist machinery • Laser cutting • 3D printing **A-Level N.E.A:** • Investigation of contextual challenges • Design brief	**A-Level N.E.A:** • User needs • Stakeholders • Existing product research • Exploration of materials • Technical specification • Generation of ideas • Design development • Critical thinking • Prototyping • Plan of manufacture • Feasibility of design solution • Critical evaluation

Prince William School
Art, Design & Technology Curriculum Map – Substantive Knowledge Progression

Substantive Knowledge Progression

	Year 7	Year 8	Year 9	Year 10 - 11	Year 12 - 13
User Needs	• How a product serves it's function to the user.	• Needs of users of different users- considering background, interest and abilities. • Design for a client.	• Adding functionality to a product to increase usability	• Needs of users of different users- considering background, interest and abilities. • Requirements for different cultures, social and economic groups. • Design for a client.	• Determination of own clients needs. • Client research to discover needs. • Using findings to inform decision making
Design Communication	• Draw basic isometric shapes • Draw basic perspective shapes	• Draw simple shapes using 3D drawing skills. • Sketch and communicate ideas in a variety of ways. Visible construction and dimension lines.	• Draw a product in isometric, 1 & 2 point perspective and 3rd angle	• Expanded drawings. Variety of drawing for purpose. • Detailed annotation and rendering of design ideas.	• Clear and accurate designs showing a range of technical drawing and rendering skills.
Material Properties	• Woods – classifications of timber, hardwoods, softwoods, manufactured boards.	• Polymers – classification, thermoplastics & thermoset plastics.	• Electronic components • Softwood properties	• Metals -classification , ferrous , non ferrous, alloys . • Aesthetics, cost and environmental impact.	• Independent research to find the most suitable materials for their own products and their properties
Health and Safety	• Workshop health and safety rules. • PPE used in the workshop.	• Workshop health and safety rules. • Control measures. • PPE used in the workshop.	• H&S when working with electrics and soldering iron (heat)	• Health & safety legislation	• Knowledge of specific H&S acts and what they encompass. • How legislation is applied in manufacturing.
Tools and Equipment	• Hand tools - tenon saw, abrasive paper. • Marking out – tri square, steel rule.	• Hand tools - coping saw, file, abrasive paper. • Fixed tools - pillar drill, scroll saw, vice.	• Soldering iron • Cleaning pads • Wood finishes (wax & resins)	• Portable power tools – hand drill. • Fixed tools – vacuum former, brazing hearth, powder coating.	• Specialist industrial manufacturing techniques and their practical applications.
Sustainable Design	• The 6 R's of sustainability. • How this product links to sustainability when used.	• Where materials come from. • Environmental implications of materials. • The 6 R's of sustainability.	• Upcycling to create the lampshade • Research of other upcycled products • Advantages & disadvantages of upcycling	• End of life consideration. • Cradle to cradle design. • Recycling and material qualities when recycled.	• Detailed knowledge of sustainable architecture and how it is used in modern design. • Planned obsolescence.
Design Feasibility	• Positives, negatives and improvements if it were to be made again.	• Positives, negatives, improvements, product analysis and ACCESS FM.	• Product assessment against user needs • Intro to product specification	• Iterative design process. • Using client feedback to influence design decisions.	• Critical analysis of their own and others work to form design stages.

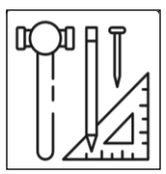
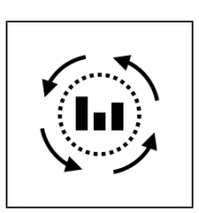
Prince William School
Art, Design & Technology Curriculum Map – Substantive Knowledge Progression

Substantive Knowledge Progression

	Year 7	Year 8	Year 9	Year 10 & 11	Year 12 & 13
User Needs	• How a product serves its function to the user.	• Needs of different users considering background, interests and abilities. • Designing for a client.	• Adding functionality to a products to increase usability. • Inclusive design.	• Needs and wants of different users. • Requirements for different cultural, societal and economic groups.	• Determination of own client's needs. • Client research to discover needs. • Using findings to inform decision making.
Design Communication	• Drawing basic isometric shapes • Drawing basic perspective shapes	• Draw simple shapes using 3D drawing skills. • Sketch and communicate ideas in a variety of ways including orthographic projection.	• Draw a product in isometric, 1 & 2 point perspective and orthographic projection.	• Detailed design drawings in appropriate style. • Rendering realistic materials.	• Clear and accurate designs showing a range of technical drawing and rendering skills.
Material Properties	• Woods – classification of timber, hardwoods, softwoods & manufactured boards.	• Polymers – classifications of plastics, thermoset, thermoplastics & bio polymers.	• Papers & boards – classifications of papers & boards, gsm, finishes.	• Metals – classifications of metals, ferrous, non-ferrous & alloys. • Aesthetic, cost and environmental impacts of material selection.	• Independent primary research to find most suitable materials for their own products and their properties.
Health & Safety	• Workshop health & safety rules. • PPE used in the workshop.	• Workshop health & safety rules. • Control measures. • PPE used for different tools.	• Health & safety when using cutting instruments. • Risk assessments on individual equipment.	• Health & safety legislation. • PPE required to use bobbin sander, metal belt sander and power tools.	• Knowledge of specific H&S acts and hat they encompass. • How legislation is applied in manufacturing.
Tools & Equipment	• Hand tools – tenon saw, abrasive paper, file, tri-square, steel rule.	• Hand tools – coping saw, abrasive paper, file. • Fixed tools – pillar drill, scroll saw, vice	• Hand tools – craft knives, safety rules, cutting mats, hot glue guns.	• Portable power tools – hand drill, orbital sander & angle grinder. • Fixed tools – brazing hearth, polymer dip coating.	• Specialist industrial manufacturing techniques and their practical applications.
Sustainable Design	• 6 R's of sustainability. • How this product links to sustainability when used.	• Where materials come from. • Environmental modifications of materials. • 6 R's of sustainability	• Upcycling products from home that would be thrown away. • Design for disassembly	• End of product life considerations. • Cradle to cradle design. • Recycling and material qualities when recycled.	• Detailed knowledge of sustainable architecture and how it is used in modern design. • Planned obsolescence.
Design Feasibility	• Positives, negatives and improvements if it were to be made again.	• Positives, negatives, improvements, product analysis using ACCESS FM.	• Product assessment against user needs. • Introduction to product specification.	• Iterative design process. • Using client feedback to influence design decisions.	• Critical analysis of their own and others work to form design practices.

Prince William School
Art, Design & Technology Curriculum Map – Disciplinary Knowledge Progression

Disciplinary Knowledge Progression

	Year 7	Year 8	Year 9	Year 10 - 11	Year 12 - 13
Explore 	• Students plan the make of their bug house and the steps needed to achieve a high grade. • Students research different types of wood, properties and their common uses. • Students generate ideas on possible additions they could make to their bug house.	• Students plan each layer of their design for the acrylic clock and how it will fit together. • Students research existing clocks and watches to complete ACCESS FM sheet. • Students generate ideas on what their clock will look like based on their chosen art movement.	• Students complete their own independent primary and secondary research to investigate chosen context. • Students complete research on materials and their properties to inform suitability. • Students complete idea generation and design development.	• Students complete detailed plans of manufacture for various projects which allows them to manage their time and resources effectively. • Research of existing products completed for all projects. • Students complete in depth idea generation for multiple projects.	• Students are given total independence to plan their materials, resources and time effectively. • Students research design movements and existing products to complete product analysis. • Students complete in depth idea generation and annotations for multiple projects.
Create 	• Students prepare their tools and materials. • Students learn about basic hand tool processes used to create parts of their bug houses. • Students follow a step by step process to manufacture the parts of their bug house.	• Students prepare a coloured paper template of their clock. • This aides the understanding of the processes needed to produce the clock to a high standard. • Students use hand tools to create the individual shapes needed for the clock.	• Students prepare the materials in school and bring in something from home to upcycle. • Students are given the process needed to create accurate cardboard models and joining techniques to achieve the best outcome.	• Students prepare materials, tools, equipment and materials for various projects. • Students learn about industrial manufacturing processes associated with the project. • Students independently complete the manufacture of multiple projects.	• Students prepare specialist manufacturing techniques and processes. • Students are given independence to follow these processes for their project. • Students independently complete the manufacture of multiple projects.
Evaluate 	• During all processes, students are encouraged to evaluate what they have done at each stage. • Students are introduced to the concept of iterative design and its importance in product design. • Students complete a final self-assessment on their finished project.	• Students complete self and peer assessments at the design stage to refine their ideas. • This leads to the iteration process of design and how they should be consistently evaluating work to make improvements. • Students complete a self assessment of their work which is allows for feedback from the teacher	• Students record feedback from teacher and peers to critically evaluate their idea. • Throughout the process, students are explicitly taught about the iterative design process and ongoing evaluations required. • Students complete thorough evaluation of final outcomes against original specification.	• Students use feedback from teachers and peers to successfully modify their projects throughout. • Iterative design process is used and encouraged at every stage for various projects. • Students complete an in depth analysis of their project to assess design feasibility.	• Students use feedback from teachers and peers to successfully modify their projects throughout. • Iterative design process is used and encouraged at every stage for various projects. • Students complete an in depth analysis of their project to assess design feasibility.

Prince William School
Art, Design & Technology Disciplinary Vocabulary

	Key Stage 3	Key Stage 4	Key Stage 5
	← Reinforce Previous	← Reinforce Previous	← Reinforce Previous
Disciplinary Vocabulary	Advise Application Cause Change Chronology Compare Consequence Contemporary Context Continuity Customer Describe Difference Explain Explore Factor Identify Importance Opportunities Reason Significance Similarity Strengths Threats Weaknesses	Audience Client Complex Contextual Knowledge Convincing Define Inference Interpretation Judgment Limitations Link Place Provenance Purpose Source Time Utility	Analyse Argument Conclude Critique Debate Developed Evaluate Stakeholder Tone Validity

Prince William School
Art, Design & Technology Key Vocabulary

	Year 7	Year 8	Year 9	Year 10 - 11	Year 12 - 13
Key Vocabulary	Tenon saw Clamp Vice Sandpaper Pillar drill Softwood Hardwood Manufactured wood Millimetre Marking out Knot Grain Waste Isometric Function Materials Belt sander Rabbet joint Butt joint Mitre Perspective Technology	Coping saw Sandpaper Customer Iterative Aesthetic Sustainability Finishing Scroll saw Hand file Computer aided design Craft knife Cutting mat Life cycle Polymer Thermoset Thermoplastic Typography Laser cutting Template	Iterative Render Oblique Dowel LED Wingnut Washer Spanner Steel rule Tri square Accuracy Usability Component	Iterative Chisel Client Prototype Vacuum forming Brazing Ergonomics Anthropometrics Soldering Resistor Capacitor Transistor Powder coating Ferrous Modifications Iterative Non-examination assessment Investigation Contextual challenges Specification Product analysis Idea generation Innovation Prototype Quality control Quality assurance Computer aided manufacture Target market Deadline	SMART materials Automation Stock form Obsolescence Critical analysis