

# 2. CURRICULUM IMPLEMENTATION OVERVIEW PLAN

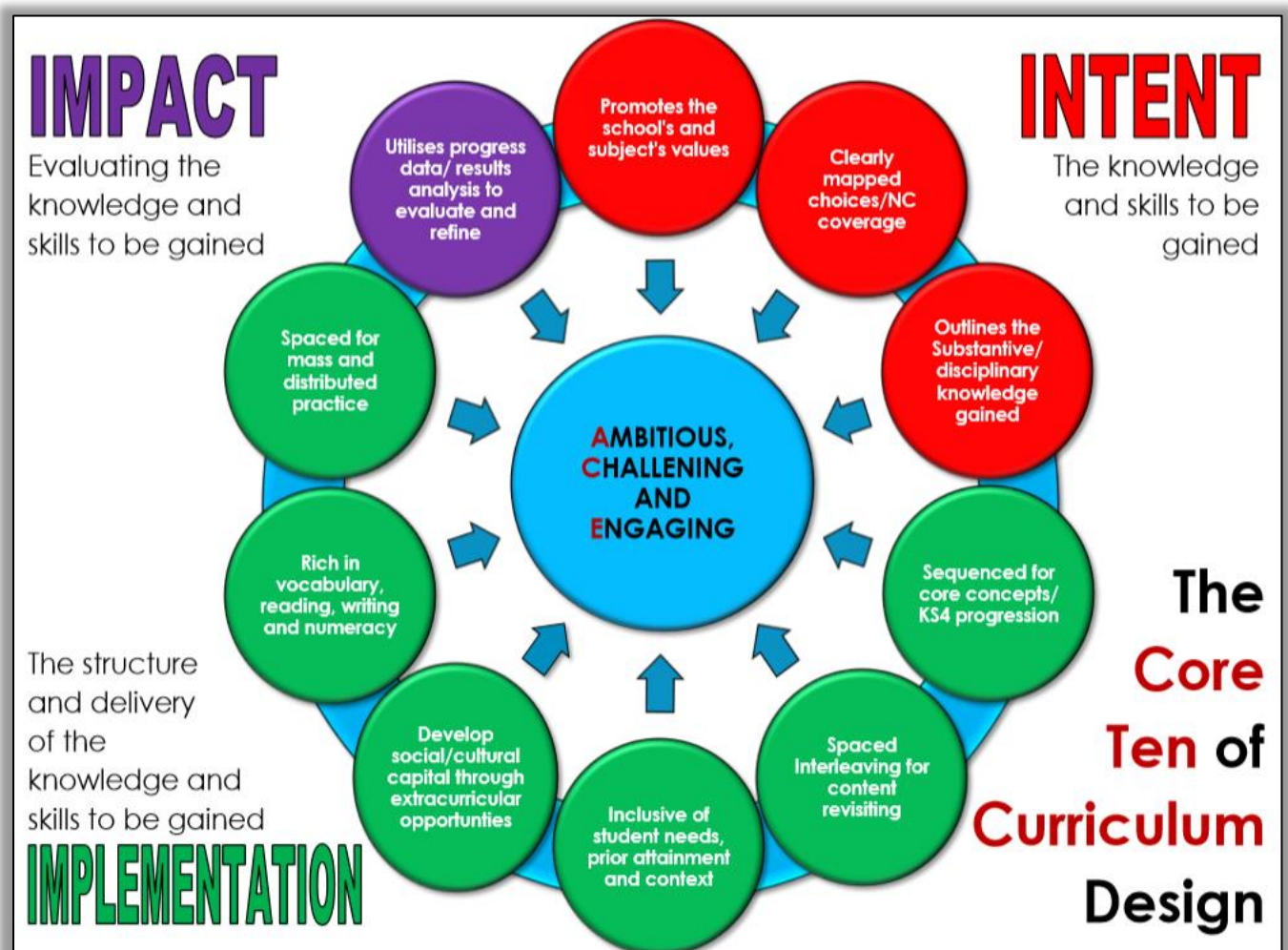
## Key Stage 4

Subject: Product Design GCSE

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Document(s) which inform this Curriculum Implementation are:

1. Curriculum Intent Overview Plan (KS4)

## THINKING PROCESS - CURRICULUM IMPLEMENTATION OVERVIEW PLAN – KS4

### IMPLEMENTATION – SEQUENCING AND PRACTICE

How are your topics sequenced below so as to ensure the following:

- key concepts are ordered and taught, so as to support progression to more challenging material
- content and concepts ordered to support progression from KS3 and to KS5
- topics are spaced between unrelated topics, to allow thinking time; then revisited and furthered
- mass practice (end of topic assessments) are used to evaluate the knowledge and skills gained
- distributed practice (mini assessments) are used where content/topics are reassessed in shortened versions, at later spaced out intervals

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<b>10</b>	<b>Unit/Topic</b>	Drawing, presentation and communication techniques. Materials properties (Wood) in manufacture of pencil box.	<b><u>MP3 Amplifier project</u></b> Influential designers. Electronic systems.  <b><u>Theory</u></b> Sustainability, product lifecycle, 6 R's	<b><u>USB memory stick project</u></b> Designing for a client CAD/CAM  <b><u>Theory</u></b> Energy production and storage	<b><u>Smart Materials project</u></b> Thermo chromatic design task  <b><u>Theory</u></b> Scales of production Industry and society	<b><u>Mechanical toy project</u></b> Designing and manufacturing and mechanical toy  <b><u>Theory</u></b> Mechanical systems Stresses and forces	<b><u>NEA</u></b> Exam board set project to be started. Investigation and research to be completed <b><u>Theory</u></b> Material sources, Paper & board
	<b>Specification/ Assessment Objective</b>	3.3.4 Design Strategies 3.1.6.1 Material categories (timber) 3.1.6.2 Material properties (timber) 3.2.5 Using and working with materials 3.2.8 Techniques and processes 3.2.9 Surface finishes 3.3.9 Materials management  A02	3.3.3 The work of others 3.1.4 Systems approach to designing 3.1.6.1 Material categories (polymers) 3.1.6.2 Material properties (Polymers) 3.2.8 Techniques and processes (soldering, laser cutter) 3.2.1 Selection of materials 3.2.3 Ecological and social footprint 3.3.4 Design strategies 3.2.4 Sources and origins A02, A03, A04	3.3.4 Design Strategies 3.3.1.1 Specialist techniques and processes 3.1.2 Energy generation and storage  A01, A02, A03, A04	3.1.3 Development in new materials 3.3.4 Design strategies 3.2.7 Scales of production 3.1.1 New and emerging technologies  A01, A02, A03, A04	3.1.5 Mechanical devices 3.2.5 Using and working with materials 3.3.4 Design strategies 3.3.9 Materials management 3.2.2 Forces and stresses  A01, A02, A03, A04	3.3.1 Investigation, primary and secondary data 3.3.2 Environmental, social and economic challenge 3.3.3 The work of others 3.2.4 Sources and origins 3.2.6 Stock forms, types and sizes 3.1.6.1 Material categories  A01, A03

	<b>Powerful Knowledge</b>	Focussing the start of the course on communication techniques allows students to develop skills but also find the most effective communication tools for them. These can then be applied to their future projects and allows them to make choices in their wider life with regards career opportunities and communication techniques.	The systems approach applied to electronic systems can be applied to a wide variety of real life situations both physical and theoretical.  Simple electronic systems principals can be applied to solving household problems with devices and systems.	The differences between different energy sources and their benefits to the environment and world around us.	Knowledge of smart/modern materials and new and emerging technologies	Knowledge of a wide variety of mechanisms used in many everyday objects.	Investigating a problem and planning how to solve and satisfy the task.  Knowledge of where some everyday materials originate and are used.
	<b>Mass Practice</b>	End of term assessment covering all topics from that term (Short answer and multiple choice questions on wood material categories & properties and application questions on presentation techniques)	End of term assessment covering all topics from that term (Short answer and multiple choice questions on electronic systems & components and the 6 R's, long answer analysis questions of product life cycles. Whole school assessments (Adapted AQA sample paper 1 – Section B Specialist technical principles removed as not yet covered).	End of term assessment covering all topics from that term (Short answer and multiple questions on Energy production & Storage and long answer evaluation question on use of CAD/CAM in industry)	End of term assessment covering all topics from that term (Short answer and multiple choice questions on smart materials, long answer comparison question on scales of production and evaluation question on designing for industry and society)	End of term assessment covering all topics from that term (Short answer and multiple choice questions on mechanical systems and long calculation questions on gear ratios and mechanical systems)	End of term assessment covering all topics from that term (Short answer and multiple choice questions on materials sources and paper & boards) Whole school assessments (Full AQA sample paper 2 as all theory content has been covered).
	<b>Distributed Practice</b>	EXIT tickets are included to gauge understanding and develop exam technique in understanding question styles. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 1 topics –Wood material categories & properties and presentation techniques).	EXIT tickets are included to gauge understanding and develop exam technique in understanding question styles. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 2 topics – Electronic systems & circuit symbols, product lifecycles and the 6 R's).	EXIT tickets are included to gauge understanding and develop exam technique in understanding question styles. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 2 topics – Energy production & storage and use of CAD/CAM in industry).	EXIT tickets are included to gauge understanding and develop exam technique in understanding question styles. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 2 topics – smart materials & their properties, scales of production and designing for industry and society).	EXIT tickets are included to gauge understanding and develop exam technique in understanding question styles. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 2 topics – mechanical systems, stresses and forces).	Assessment is provided in the form of a practice NEA 1 task with the opportunity to develop work from feedback. Each individual theory topic has an end of topic test which is repeated 2 week later to gauge progress. (Term 2 topics – Material sources and papers & boards).

<p><b>What are the key concepts to be covered?</b></p>	<p>What is the best way to communicate a design idea for different products?          How product designs are influenced by market demand and user needs?          What are the environmental impacts of using different materials when designing products?          How have everyday products gone through the design process to reach the consumer?          How is energy produced and stored and it's implications on the environment?          How can our choice of materials influence a product outcome?          How do mechanical products work?          Where do our materials come from?</p>
<p><b>What prior knowledge, at KS3, are you assuming they have?</b></p>	<p>A general understanding of</p> <ul style="list-style-type: none"> <li>• Materials, their properties and environmental impact</li> <li>• The industrial processes and their links to processes used in school</li> <li>• Key practical skills required for each material area</li> <li>• CAD software in particular 2D Design</li> <li>• A range of technical drawing and presentation techniques (annotation, isometric drawing, 1 &amp; 2 point perspective and rendering)</li> <li>• Electronic circuits and components</li> <li>• Influential designers and branding</li> </ul> <p>A thorough grasp of the design process and how to apply it.</p>
<p><b>What knowledge do they need to have a successful start to Year 11?</b></p>	<p>Detailed knowledge of</p> <ul style="list-style-type: none"> <li>• Materials, their sources and properties</li> <li>• The environmental impact of designing and manufacturing products</li> <li>• Mathematical principles involved in designing</li> <li>• The systems approach electronic and mechanical systems</li> <li>• How energy is produced and stored</li> <li>• CAD software including 2D Design and Solidworks</li> <li>• CAM machines and their use</li> <li>• Industrial manufacturing processes and principals</li> <li>• Smart/modern materials their properties and uses</li> <li>• At least 2 influential designers from the last 100 years</li> <li>• A wide range of practical skills required in the workshop</li> </ul>
<p><b>How are topics spaced between unrelated topics?</b></p>	<p>All products are based around the design process so revisit each section regularly and look at different techniques for using the process (wooden box uses isometric sketching to present ideas, electronics product builds on this and uses isometric and CAD designing to model ideas, smart materials product uses alternative sketching techniques and physical modelling etc.).          Sustainability &amp; the environment, material properties, user needs and industrial techniques run through all projects and are revisited regularly.</p>

11							
Unit/Topic	<u>NEA</u> Creating design ideas, development (models and CAD)	<u>NEA</u> Product manufacture	<u>NEA</u> Product testing and evaluation	<u>Exam preparation</u> Revision program to cover all theory topics and exam technique	<u>Exam preparation</u> Revision program to cover all theory topics and exam technique		
<p><b>Specification/ Assessment Objective</b></p>	<p>3.3.4 Design strategies            3.3.5 Communication of ideas            3.3.6 Prototype development            3.3.7 Selection of materials and components            3.3.8 Tolerances</p> <p>A03, A04</p>	<p>3.3.9 Materials Management            3.3.10 Specialist tools and equipment            3.3.11 Specialist techniques and processes</p> <p>A02, A04</p>	<p>3.1.1 Critical evaluation informing design decisions</p> <p>A03</p>				

<b>Powerful Knowledge</b>	Creating ideas and developing them to find an appropriate solutions which satisfies user's needs.	Manufacturing a product to a high standard by overcoming problems as they arise.	Making judgements about their own products and using feedback from others.			
<b>Mass Practice</b>	Whole school assessments (Full AQA sample paper 1).	Whole school assessments (Full AQA June 2019 paper).		Whole school assessments (Full AQA sample paper 2).		
<b>Distributed Practice</b>	Exam questions set as homework to continue practicing technique and recap key theory knowledge (Homework topics to tie in with NEA section being covered – The work of others, presentation techniques, analysis of existing products) NEA tasks relate to Y10 theory content and are used to recap knowledge through feedback.	Exam questions set as homework to continue practicing technique and recap key theory knowledge (Homework topics to tie in with NEA section being covered – Properties of materials, calculating material quantities and nesting parts, production techniques and scales of production) NEA tasks relate to Y10 theory content and are used to recap knowledge through feedback.	Exam questions set as homework to continue practicing technique and recap key theory knowledge (Homework topics to tie in with NEA section being covered – Analysis and evaluation of products, environmental impact & sustainable design, product life cycles) NEA tasks relate to Y10 theory content and are used to recap knowledge through feedback.	Frequent use of exam questions in session to recap Y10 theory knowledge and develop exam technique.	Frequent use of exam questions in session to recap Y10 theory knowledge and develop exam technique.	
<b>What are the key concepts to be covered?</b>	<p>What is the best way to communicate a design idea for different products?  How product designs are influenced by market demand and user needs?  What are the environmental impacts of using different materials when designing products?  How have everyday products gone through the design process to reach the consumer?  How is energy produced and stored and it's implications on the environment?  How can our choice of materials influence a product outcome?  How do mechanical products work?  Where do our materials come from?</p>					
<b>What knowledge do they need to have a successful start to Year KS5?</b>	<p>In depth knowledge of</p> <ul style="list-style-type: none"> <li>• Materials, their sources and properties</li> <li>• The environmental impact of designing and manufacturing products</li> <li>• Mathematical principles involved in designing</li> <li>• The systems approach electronic and mechanical systems</li> <li>• How energy is produced and stored</li> <li>• CAD software including 2D Design and Solidworks</li> <li>• CAM machines and their use</li> <li>• Industrial manufacturing processes and principals</li> <li>• Smart/modern materials their properties and uses</li> <li>• At least 2 influential designers from the last 100 years</li> </ul> <p>A wide range of practical skills required in the workshop</p>					
<b>How are topics spaced between unrelated topics?</b>	The start of y11 is very much focussed on the NEA task which revisits many of the topics covered in Y10 depending on the task set and the route the students decide to take in their designing. Exam questions homework is set to cover all topics covered in Y10 with topics timed to focus on relevant sections of the NEA task.					

### IMPLEMENTATION – STUDENT NEEDS AND SUPPORT

**How is student learning supported below so as to ensure the following:**

- extracurricular/career opportunities which develop social and cultural capital
- key vocabulary, reading, writing and numeracy opportunities
- support for SEND and students with Low Prior Attainment, as well as challenge for students with High Prior Attainment

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<b>10</b>	<b>Social/ Cultural Capital</b>	Entrust STEM ambassador visit to promote creativity, investigation and iterative design.		Extra curricula club to manufacture planters for the Academy herb garden.			
	<b>Tier 2/3 Vocabulary</b>	Tier 2 classification, properties, grain, manufactured, density, aesthetics, ergonomics, deforestation Tier 3 deciduous, coniferous, strength, hardness, toughness, malleability, ductility, elasticity	Tier 2 sensor, components, polymer, conductivity, aesthetics, ergonomics, ethical, sustainability, life-cycle, atmospheric, pollution detrimental Tier 3 microcontroller, solder, flux, fusibility,	Tier 2 kinetic, hydro-electric, biomass distillation, extraction, refining Tier 3 polymers, prototype,	Tier 2 industry, enterprise, finite, culture, society, environment, ethics, manufacturing, function, conductive, enhanced, resistant Tier 3 sustainability, obsolescence, nanomaterials, graphene, thermos-chromatic, photo-chromatic, polymorph, encapsulated	Tier 2 lever, motion, pulley, aesthetics, ergonomics, magnitude, reinforced, enhanced, flexible Tier 3 linkage, tension, compression, torsion, shear, lamination, webbing, interfacing	Tier 2 corrugated, duplex, properties, alloys, aesthetics, ergonomics Tier 3 ferrous, strength, hardness, toughness, malleability, ductility, elasticity, annealing, perforation,

	<b>Reading</b>	Exit tickets use exam questions to familiarise students with command words. Research materials and use of Day dream education pocket posters requires student reading to pick up key words and knowledge with end of topic testing to gauge understanding. (Daydream pocket posters to be covered – communication of ideas, material properties, natural timbers, manufactured boards, selecting materials, Timbers [sources and origins, stock forms types and sizes, properties, surface finishes & treatments])	Exit tickets use exam questions to familiarise students with command words. Research materials and use of Day dream education pocket posters requires student reading to pick up key words and knowledge with end of topic testing to gauge understanding. (Daydream pocket posters to be covered – Electronic systems, polymers, polymers [sources and origins, stock forms types and sizes, properties, surface finishes & treatments], Electronic systems [properties, stock forms types & sizes, shaping & forming and surface treatments & finishes], environmental, social and economic challenges)	Exit tickets use exam questions to familiarise students with command words. Research materials and use of Day dream education pocket posters requires student reading to pick up key words and knowledge with end of topic testing to gauge understanding. (Daydream pocket posters to be covered – Energy generation & storage, prototype development)	Exit tickets use exam questions to familiarise students with command words. Research materials and use of Day dream education pocket posters requires student reading to pick up key words and knowledge with end of topic testing to gauge understanding. (Daydream pocket posters to be covered – New & emerging technologies, developments in new materials, ecological & social issues, scales of production)	Exit tickets use exam questions to familiarise students with command words. Research materials and use of Day dream education pocket posters requires student reading to pick up key words and knowledge with end of topic testing to gauge understanding. (Daydream pocket posters to be covered – mechanisms, gears, cams & followers, pulleys & belts, levers & linkages, forces & stresses)	Research task requires extended reading. (Daydream pocket posters to be covered – Design strategies, the work of others, collecting & analysing data, design & manufacturing specifications)
	<b>Writing</b>	Each end of project test includes at least 2 extended writing questions (Why pine is a suitable material for manufacture of wardrobes (11.2 Q17), explaining the process of processing a tree into usable boards(11.2 Q14)) Annotation of design ideas using ACCESSFMM to fully communicate design proposals.	Each end of project test includes at least 2 extended writing questions (evaluating how certain materials can be seen as a more ethical choice (11.2 Q18), explanation of the 6 R's (11.3 Q15)). Extended research task on influential designers to include facts, analysis of their work, personal opinion and conclusions.	Each end of project test includes at least 2 extended writing questions (evaluation of a specific product (11.2 Q19) and adapting it to suit a specific market (11.2 Q22)).	Each end of project test includes at least 2 extended writing questions (Describing manufacturing processes used to produce a specific product (11.2 Q16), evaluating the use of different scales of production (Own)) Detailed descriptive writing required to define each of the scales of production and their differences.	Each end of project test includes at least 2 extended writing questions (Describing methods of strengthening or reinforcing materials (11.2 Q15), the purpose of and methods of quality control (11.1 Q18))	NERA section A requires extended writing on presenting research findings, section b requires a design brief and specification to be produced. Each end of project test includes at least 2 extended writing questions (analysis and explanation of a data set (11.2 Q21), importance of collaboration (11.1 Q23)) Presentation of research findings for NEA task.

	<b>Numeracy</b>	Calculation of material costs, surface area and volume. Efficient material use, pattern spacing, nesting and minimising waste.	Analysing responses to user questionnaires/surveys. Presentation of survey responses using percentages. Use of percentile ranges in anthropometric and ergonomic data.	Scaling of drawings and working to a datum.	Calculation of material costs	Arithmetic and numerical computation e.g. use ratios. Use angular measures in degrees. Changing the magnitude and direction of forces.	Working to tolerances. Analysing responses to user questionnaires/surveys. Presentation of survey responses using percentages.
	<b>How does the PoS support students with SEND needs?</b>	<p>Learning screens and lesson notes are printed (on appropriate coloured paper) for those students that require them. Dyslexic students are provided with appropriate coloured exercise books. Seating plans take into account student needs, whether that is grouping SEND students to gain support from an LSA or seating students with an appropriate student who can offer support.</p> <p>Where SEND students do not have an LSA in lessons technician support is provided during practical activities.</p> <p>Key words are highlighted in lesson notes.</p> <p>Practical resources are labelled clearly within the room using dyslexia friendly background colours and fonts. Photo booklet of equipment and names provided.</p> <p>Practical work is demonstrated with chunked demonstrations and tasks where needed.</p> <p>Learning is revisited in sessions and through-out the course to reinforce key concepts.</p> <p>DJB allocated as SEN rep for D&amp;T to disseminate information.</p>					
	<b>How does the PoS support students with low prior attainment/challenge those with high prior attainment?</b>	<p>LPA</p> <ul style="list-style-type: none"> <li>• Writing frames and templates are provided for written activities</li> <li>• Appropriately graded modelled examples are provided or work is modelled during session</li> <li>• Practical outcomes are differentiated by skill level required and taking into account students expected progress.</li> <li>• Practical activities are demonstrated with further chunked demonstrations for those that need it.</li> <li>• Technician support is available for students lacking confidence in practical tasks</li> <li>• Assessments are differentiated with graded questions provided</li> <li>• Extended learning mentoring sessions are available after school for those that need extra time/help#</li> </ul> <p>HPA</p> <ul style="list-style-type: none"> <li>• Practical activities are differentiated according to skill level and level of complexity</li> <li>• Opportunity to develop/extend products through extra material resources and equipment is included</li> <li>• Written instructions are provided for students to attempt practical independently while demonstration continues with less able students</li> <li>• Assessments are differentiated with graded questions provided</li> <li>• Extended learning sessions are available for students to carry out more complex tasks which don't fit in a normal session</li> </ul>					
	<b>How does the PoS offer contextual content appropriate to Amington students?</b>	<p>Product Design is often chosen predominantly by boys. To cater for this theory knowledge is built into practical activities as much as possible with the opportunity to use extended writing key terminology developed throughout the course.</p> <p>The course offers insight into a range of careers based around the design industry and provides opportunities for students to investigate a wide range of careers outside their local area. Entrust STEM ambassadors are used to promote the wide range of career opportunities available to students with a Product Design qualification.</p>					
<b>11</b>	<b>Social/Cultural Capital</b>	Entrust STEM ambassador visit to act as client and give feedback on design ideas.		Entrust STEM ambassador visit to act as client and provide evaluation of final outcomes.			
	<b>Tier 2/3 Vocabulary</b>	Tier 2 Analysis, Investigate, aesthetics, <i>Tier 3 Dependent on NEA task set and can include all vocabulary from Y10</i>	Tier 2 Analysis, Investigate, aesthetics, <i>Tier 3 Dependent on NEA task set and can include all vocabulary from Y10</i>	Tier 2 Analysis, Investigate, aesthetics, <i>Tier 3 Dependent on NEA task set and can include all vocabulary from Y10</i>	All vocabulary from y10.	All vocabulary from y10.	

<b>Reading</b>	Exam revision questions set as homework include understanding of command words and key vocabulary. (Topics – Material properties, timber and it's sources, manufactured boards)	Exam revision questions set as homework include understanding of command words and key vocabulary. (Topics – electronic systems, polymers and their sources, environmental & social challenges)	Exam revision questions set as homework include understanding of command words and key vocabulary. (Topics – energy production and storage, mathematical based questions)	Exam revision questions set as homework include understanding of command words and key vocabulary. (Topics – new and emerging technologies & materials, scales of production)	Exam revision questions set as homework include understanding of command words and key vocabulary. (Topics – mechanical systems)	
<b>Writing</b>	NEA section C requires extended writing on presenting research findings, annotation of ideas, evaluation of designs.	NEA section D requires extended writing on development of ideas, evaluation and analysis of models.	NEA Section F requires extended writing on presenting research findings, annotation of ideas, analysis of feedback and presenting evaluations.	Exam revision questions require extended writing in at least 3 questions per paper. Techniques for presenting these questions are modelled and practiced.	Exam revision questions require extended writing in at least 3 questions per paper. Techniques for presenting these questions are modelled and practiced.	
<b>Numeracy</b>	Scaling of drawings and working to a datum.	Calculation of material costs, surface area and volume. Efficient material use, pattern spacing, nesting and minimising waste.	Analysing responses to user questionnaires/surveys. Presentation of survey responses using percentages.			
<b>How does the PoS support students with SEND needs?</b>		<p>Learning screens and lesson notes are printed (on appropriate coloured paper) for those students that require them. Dyslexic students are provided with appropriate coloured exercise books. Seating plans take into account student needs, whether that is grouping SEND students to gain support from an LSA or seating students with an appropriate student who can offer support.</p> <p>Where SEND students do not have an LSA in lessons technician support is provided during practical activities.</p> <p>Key words are highlighted in lesson notes.</p> <p>Practical resources are labelled clearly within the room using dyslexia friendly background colours and fonts. Photo booklet of equipment and names provided.</p> <p>Practical work is demonstrated with chunked demonstrations and tasks where needed.</p> <p>Learning is revisited in sessions and through-out the course to reinforce key concepts.</p> <p>DJB allocated as SEN rep for D&amp;T to disseminate information.</p>				
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**How does the Implementation Plan meet the ACE curriculum design?**

<b>Ambitious</b>	All projects are set up to push students thinking outside the box. Projects are career centred and allow students to investigate use of technology and skills which they may not be aware of and open their eyes to opportunities which they may have never expected to be within their grasp.
<b>Challenging</b>	All projects allow students to stretch their knowledge and more importantly practical abilities to master skills which they may not have been aware of let alone tried. Students are encouraged to utilise hand tools and modern manufacturing techniques in the workshop.
<b>Engaging</b>	If D&T is not engaging then the curriculum has been set up poorly. It incorporates a wide range of activities, skills and knowledge which will reach out to all students. Most projects allow students to focus designs to their own style and all result in a manufactured product.

**What are the current strengths of the Implementation Plan?**

The plan allows for all theory knowledge to be delivered during y10 meaning y11 can be used to focus on application of the knowledge during the completion of the NEA tasks.  
 The plan provides students with the opportunity of using a wide range of different materials, hand tools and modern technology to produce their outcomes keeping the curriculum engaging.

**What specific actions have to be taken in response to the above? Please consider:**

- Core concept changes;
- Space interleaving changes;
- Modifications to ensure an ACE curriculum design;
- CPD for teachers in your subject area;
- Additional research you have to consider as part of this review.

Projects have been adapted to fit all theory content in to year 10 so it can be applied to their NEA project.  
 Further work/research needs to be carried out to provide further social/cultural capital opportunities.

AQA Design & Technology Assessment Objectives

- AO1: Identify, investigate and outline design possibilities to address needs and wants.
- AO2: Design and make prototypes that are fit for purpose.
- AO3: Analyse and evaluate:
  - Design decisions and outcomes, including for prototypes made by themselves and others
  - Wider issues in design and technology.

- AO4: Demonstrate and apply knowledge and understanding of:
  - Technical principles
  - Designing and making principles.