Richard Lander School

Statement of Intent

Every subject maximises the potential of each student, enabling them to become successful learners, confident learners and responsible citizens. We will ensure that all students are well prepared for life and work and are keen to make a positive difference to the world they live in.

Design Technology

Intent

We believe that the design process is different for each individual, consequently we try to create an environment suitable for students to be creative in a number of different ways. Design Technology not only teaches students coordination skills and the satisfaction of making things with your hands, it also teaches them problem solving skills, which can be applied to all areas of life from adolescent through to adulthood. We want our students to recognise the positivity of failure and understand it is part of the process of iteration to reach design success.

Skills

DT teaches a range of skills that are vital for student success after RLS. They will obviously gain the experience of working with different materials, a range of machines and tools to produce 2D and 3D products. But they will learn many more transferrable skills that can be applied in a range of different areas of life; when given problems students are taught how to research around the problem, looking for inspiration and solutions. They will develop analysis and evaluation skills, considering the good and bad things about materials, processes and even their own ideas. Students will develop communication skills, especially when explaining their own designs and prototypes. They will learn how to come with up imaginative and creative solutions to problems and avoid stereotypical responses. They will develop confidence when trying new things and resilience if they don't succeed first time.

Purpose of Study

DT is not only a creative subject, but an essential one for providing us with the designers, makers and engineers of the future. Now more than ever there is a need to consider the moral, social and environmental impact our lifestyles and choices, and the bearing they have on the planet. Students should consider how intelligent design can provide the solution to many of the current problems we are experiencing.

Aims

The national curriculum for Design Technology aims to ensure that all students:

- Are aware of the **global responsibility** of future designers
- Learn a variety of approaches to enable them to design im**aginative and innovative solutions** to problems
- Develop **practical skills** with a range of tools, materials and machines
- Can **critically analyse** and evaluate their own and the work of others
- Use both computer aided design and computer aided manufacture to create outcomes

We believe that, along with developing students' practical skills, it is vital to encourage students to consider the wider world in design technology and carefully consider this when making design decisions. This includes looking at the work of others, social awareness campaigns and social movements, exploring other cultures and investigating the need for bodies like FSC, Fairtrade, and equality issues within this area of study. In conjunction with this, we regularly discuss potential career opportunities with our students from Year 7 through to Year 11. Either through projects where they are the "graphic designer" or "engineer" in a company, references to job links/local companies and visits from potential employers such as A&P, Teagles and Pendennis Shipyard.

Assessment

KS3 – Each term students are assessed on a variety of tasks including; spelling tests, homework tasks, design task, their practical outcome and a written assessment.
This is to ensure that the highest marks are awarded to students who demonstrate a range of skills (such as their practical skills, literacy knowledge and independent study ability).
Following the assessments and end of term ranking, teachers will review and identify any students who are making less than expected progress. These students are then focused on during the following term to ensure that performance improves, through meaningful intervention such as the use of templates to allow them to make progress. Previous year's data is available on SIMs for teachers to make sure progress continues from one year to another.

KS4 – Students are assessed throughout the year using; class tests against recently taught and previously taught knowledge, 3 mock examinations across the 2-year course, practical outcomes, design (and sketching) work and homework tasks.
Following assessments and end of term anticipated grade assessments, teachers will compare grades with FFT05 targets and identify any students who are making less than expected progress. These students are both focused on in future lessons or invited to intervention sessions after school. They may also be welcomed to targeted intervention workshops during the school day to increase their progress and subject knowledge.

Schemes of work for projects and individual lesson plans are continually reviewed throughout the year and often modified or changed to ensure the focus of learning meets all curriculum needs.

Rationale

KS3

Throughout KS3 the projects are designed to build on student's ability, confidence and knowledge of machines – with a focus on the scroll saw, pillar drill and linisher (sanding machine).
Projects will become more challenging as students move through the school and the repeated use of machines will enable students to become more competent and confident when using them.

The first project in **Year 7** is a design and make project to allow students to understand the stages of the iterative design process. In the second term in Year 7 we focus on 3D drawing skills both in CAD and hand drawing techniques including isometric and perspective drawing. These drawing skills are vital for communicating design ideas as they progress through the key stages, for our subject as well as other lessons and wider life. The products we make are in 3D, so it is important that students can draw in 3D to communicate designs and prototypes. The next project is "trinket box" a focused practical task which introduces students to a second manufactured board - plywood, building on the theoretical knowledge of MDF covered in the "jewellery" project. This project is designed to develop skills and confidence on the 3 main pieces of equipment in the workshop. Lastly, the final "coaster" project gives students more creative responsibility, with a focus on user centred design and cultural awareness, starting them on the path of considerate design leading to making 4 coasters with a stand to hold them.

During the first two terms in **Year 8**, students complete a rotation of projects (so resources, equipment and rooms can be shared in the department). The "**birdfeeder**" project is designed to introduce students to the world of engineering, focusing on metals and polymers as the material focus. Students are also taught tolerances and quality control, this builds on marking and measuring skills taught in Year 7. Students are taught about the impact of polymers, recycling in industry, as well as how we can recycle polymers here at RLS.
The "clock" project develops understanding of a specification and is designed to reinforce practical skills learnt in the previous year to develop competence and confidence when using the 3 main machines in the workshop. The "endangered species" project encourages students to fully embrace the design process through CAD, building on knowledge of CorelDraw learnt during the graphics project in the second term of Year 7. They begin to understand the importance of graphic

design components This project teaches students how to research and develop ideas through to a final design, as well as the environmental issues surrounding animals and their homes.

The final project “bug box” in Year 8 introduces students to natural timber for the first time and focuses on the environmental impact of wood. This is a fairly new project and has been introduced to reduce the amount of MDF due to its material carbon footprint (the main material of the box being locally sourced Spruce). The initial stages of manufacture will be teacher led, with all students using the same drawings, with opportunity for students to use their knowledge of materials and processes to customise the rest. This builds on the customisation skills taught during the “coaster” in Year 7 and prepares them for more complex design and make tasks at the end of Year 9.

In **Year 9** the focus changes from the outcomes we are making, to the theory we are learning. Names of products on the booklet are replaced with topics e.g.; polymers, systems and control, timbers, sustainable design – during the first project we reintroduce students to the iterative design process. We teach this explicitly in year 9 as it is a more advanced way of designing and will be the main way of working in KS4. The making projects include a hardwood box, phone stand and festival ticket, which continue to develop skills on machines, equipment and CAD. We also cover the life cycle of polymers and timbers from sourcing, to production, to disposal; soldering and control systems and sustainable design.

KS3 DT at RLS has been designed to take into account two things: firstly, for students planning to pick DT, Engineering or Graphics as an option, the KS3 curriculum will provide them with the foundation of tools and knowledge they will need to become successful, innovative, competent designers, makers and engineers during their GCSE years and beyond.
Secondly, for students not wanting to continue the subject into KS4, they will gain transferrable work skills (such as problem solving, resilience and creativity), an understanding of the moral responsibility of design, along with increased practical competence for their future selves.

In Year 10 and Year 11 we very much are guided by the exam boards and follow the order of delivery that they suggest.

GCSE Design and Technology

In **Year 10** during term 1, students work on a “timber” project which builds on knowledge of the material covered in Year 9. In addition, they learn more about how the material is sourced how it is changed from raw form to stock form. Students are taught to use more advanced tools and processes, standard components and material finishes. These include hand planes, using laser cutters independently, fitting hinges, accurately marking out and assembling a range of timber joints, and creating orthographic projections.

During term 2 students are introduced to new and emerging technologies such as new and smart materials, CNC and manufacturing methods. They create a colour changing coaster to begin to understand how materials can react to their external stimuli. They explore designers and design companies such as Zaha Hadid, Phillippe Starck and Ettorre Sotsass and develop design skills including the use of CAD CAM, including laser engraving timbers and cutting/scoring papers/boards.
Learners will begin to understand the power of renewable energy sources with a focus on Solar, to create a solar powered buggy that is battery free. They will begin to consider how renewable energy can be harnessed and stored.

Lastly, in term 3 students look at commercial production and companies such as IKEA to create flat pack furniture, exploring its impact on the environment and businesses moral and social obligations.

The content covered in these areas will give students the knowledge and techniques needed to complete the NEA (Non-Examination Assessment) in Year 11 with independence and confidence.

After completion of the NEA in Year 11, students will revisit the content areas numbered above as part of their revision program in preparation for the exam.

GCSE Graphic Communication

In Graphics students will cover the following content in Year 10:
Components of Graphic design – this is where students will look at the main components of graphic design, which will form the foundation of all future analysis and design. Students start by creating a logo focusing on these components, which aims to help them to remember the main components – imagery, typography, line, composition, colour and tone.
Students will look at the life and work of graphic designers – will give students the opportunity to look at the work of others and experiment in their style.
Learners will begin to understand responding to the requirements of a graphic design brief, including designing book covers, packaging and advertising campaigns. Through creating a range of graphic outcomes, students begin to find their area of interest and 'design voice'.
Students learn how to work with a range of materials, tools and techniques including: charcoals, watercolours, pen & ink, acetate and tracing paper, and CAD based packages including CorelDRAW and Adobe Creative Cloud.
During term 2 of Year 10, students begin to follow a design process from start to finish, through their GCSE Graphic Communication 'Component 1' - where they will begin to look at issues 'in the news' and create graphics focused around communication and expression, including magazine covers and posters. They will use the laser cutter to experiment with stencils in the style of Shepard Fairey, and create illustrations in the style of Irene Rinaldi to expand their techniques.

The content covered in these areas will give students the knowledge and ability needed to complete Component 2 in Year 11 with independence and confidence. During this, students will take a sustained look at an exam question and approach it with openness and creativity. During their 10-hour exam in May of Year 11, students will create a graphic outcome to resolve that exam question. In previous years, examination starting points have included: Botanical Gardens, Playing Cards and The Measure of Time.

NCFE Engineering

There are 9 content areas to cover during the course. Due to the amount of students opting for the course, there will be a rotation of projects to allow for safe use of equipment in the department. All Engineering students will cover the following content areas in the first term of Year 10:

1. Engineering disciplines - where students will learn about the different disciplines and sectors involved in Engineering.
2. Applied science and mathematics in engineering - students will be introduced to SI units and be expected to apply them during their project work.

Group 1 will also cover the following content areas during the first term in Year 10:

1. The health and safety legislation governing engineering.
2. Properties and characteristics and selection of engineering materials
3. Engineering tools, equipment and machines - in particular the centre lathe, pillar drills, braising hearth, polisher, hacksaw.
4. Production planning techniques: Specifically, risk assessments
5. Computer-aided design (CAD) engineering drawings.
6. Applied processing skills and techniques: Practical work including a turning project on the centre lathe and a hand-tool project demonstrating drilling, tapping, use of dies, and brazing on the brazing hearth.

Group 2 will also cover the following content areas during the first term in Year 10:

6. Hand-drawn engineering drawings - with a focus on freehand, isometric and orthographic skills.
3. Reading engineering drawings - in particular third angle projection
4. Properties and characteristics of engineering materials - in particular ferrous and non-ferrous metals
5. Engineering tools, equipment and machines - in particular marking out and modification tools.
9. Applied processing skills and techniques Practical work focusing on the safe and correct use of hand tools to mark out, cut, drill and modify sheet metal and manufactured board, alongside circuit-building, soldering, and interpreting drawings to assemble a component.

During term 2, the groups will swap to ensure all content is taught to all students.

During term 3, both groups will build on knowledge gained over the previous two terms and will cover the remaining content area:
9. Applied processing skills and techniques - in particular casting and milling.

They will also re-visit the previous content areas above, to embed prior knowledge.

Students will refine and apply their skills through a final project that involves reading a parts list and interpreting multiple orthographic drawings to produce a functioning lamp. This project will incorporate components made in the previous term, which must fit together seamlessly. In addition to embedding processing skills, students will apply their knowledge of joining and finishing techniques. The project will require the use of non-ferrous and ferrous metals, softwoods, and recycled high-impact polystyrene. Processes such as milling, vacuum forming, and soldering will also be used.

The content covered in these areas will give students the knowledge and techniques needed to complete the NEA (Non-Examination Assessment) in Year 11 with independence and confidence. After completion of the NEA in Year 11, students will revisit the content areas numbered above as part of their revision program in preparation for the exam.