OAE Computing Curriculum: Statement of Intent

Purpose of study

Technology is becoming ever more important in our student's day to day lives and this trend is likely to increase and even accelerate in the future. We are preparing students for jobs that do not yet exist and to use technology that has not yet been invented. We will do this by ensuring that every student has the opportunity to study and use a wide range of technology building the resilience to both learn to use new technology and solve new problems in a logical algorithmic way. The OCL Computing curriculum will ensure that every student is able to navigate the digital world confidently in a safe and socially responsible manner.

We value character, competence and community in our curriculum:

- **Character:** Enabling students to develop and build solutions to both digital and real-world problems by applying computational thinking. Students will be able to take complex problems and break them down into manageable chunks and build solutions using skills such as pattern recognition, abstraction and algorithmic thinking.
- **Competence**: Developing pupils' digital literacy allowing them to adapt and be active users of the ever-changing technology used in their future careers and personal lives.
- **Community:** Inspiring students to become active creators of and innovators instead of passive users of technology. Online safety and a solid understanding of the moral, legal and ethical considerations of technology are embedded at every level of our curriculum to ensure that students know how to use technology responsibly.

Core concepts and principles of progression

Our curriculum will ensure that students develop and sustain theoretical knowledge alongside practical computing skills. Students will learn the foundational knowledge and, from this foundation, will have the opportunity to practice and apply that knowledge to innovate, build and create. E-safety will be embedded at every level of the curriculum ensuring that where appropriate each unit takes exposes and ratifies the legal, moral and ethical ramifications of using technology. While studying the OCL Computing curriculum students will:

- **Use a wide range of software and technology** - we know that students will need to use a multitude of different software packages in their personal, academic and professional lives. So that students can build the resilience to adapt to new software, the curriculum will utilise a multitude of selected software packages on both Windows PC and iPad.
- **Embed fundamental ICT skills** – embedded in each unit will be opportunities to practice the fundamentals of ICT use. Students will learn to use a variety of input devices effectively (keyboard, mouse and touch devices), file management, communicating online (email, in app messaging and collaborative documents) and how to choose the right device / software for a given task.

- **Modify and create computer programs** – students will learn to read, modify and create computer programs using the PRIMM method. These programming skills will be practiced across 2 languages starting with Scratch and moving to Python by the end of KS3. Students who are enrolled in the Computer Science GCSE will continue to master these practical programming skills with the Python Language.
- **Create and edit a variety of media** – in addition to the creation of computer programs, students will create, edit and use all forms of media including text, images, video and audio. This media will be created both as small individual projects and as part of larger pieces of work such as presentations and websites.
- **Be aware of the risks of technology and how they can be minimised –** e-safety will be embedded at every level of the curriculum. Units will not only explicitly teach e-safety such as when studying online safety, social media and cyberbullying, but also will retrieve and embed this understanding implicitly such as when discussing networks, data and cybersecurity will embed legal, moral and ethical concerns.
- **Use computational thinking skills to solve real world problems** – decomposition, pattern recognition, abstraction and algorithmic thinking are some of the most important transferable skills from computing. Students will take problems such as converting values, measuring space or managing data and use these skills alongside their programming knowledge to design and build solutions for them.
- **Recognise computer hardware and understand how each component works** – alongside learning to recognise and use each component students will learn how to compare components of the same type such as storage devices, processors and memory. This knowledge will allow students to compare and design systems for different tasks.
- **Understand what networks are and how they are used** – this includes understanding how computers are connected to a network, how common network hardware works and the benefits of using networks. Students will also have an understanding of how different networks connect together and how messages are broken into packets before being sent across networks such as the internet.
- **Understand simple Boolean logic** – [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]
- **Recognise and predict technology trends –** computing is a young and ever-changing field. By studying the history of computing, how it is used in society today and key areas of research (Artificial Intelligence, robotics and augmented reality to name a few) students will be better prepared for the changes technology is likely to bring to everyday life.
- **Maximising the use of Horizons –** lessons will make use of the iPads that all students have due to the Horizons project. Students will use a number of apps to complete tasks alongside traditional PCs where appropriate. Students will work on some tasks by using both devices simultaneously by utilising live office files and online resources such as Formative. This will help students become more adaptable with using different types of technology to complete tasks.

Aims/Outcomes

Through a carefully sequences and ambitious curriculum we will develop student knowledge and understanding across the 3 areas of computing:

Digital literacy – students will:

- Be able to use a wide variety of popular software packages.
- Build the resilience to quickly adapt to changes in software and to new packages entirely.
- Understand how technology is used in a variety of careers both within and outside of the technology industry.
- Be able to protect their online identity and use technology safely.

- Be able to create and edit different forms of media (text, images, sound and video).
- Be able to find accurate information on the internet and recognise misleading information.

Information technology – students will:

- Be able to sort and manipulate data using database and spreadsheet software.
- Create and present information for a variety of contexts while ensuring it is fit for purpose and appropriate to the target audience.
- Understand the legal, moral and ethical issues caused by the increase of technology in our daily lives.
- Evaluate whether a given software package is fit for purpose for a given task.
- Design a basic network for a given scenario taking into account the number of users and advantages of different hardware.

Computer Science – students will:

- Modify and build a variety of programs using visual and text-based programming languages.
- Understand how each component of a computer works and contributes to the overall system
- Compare and evaluate different storage types for a given task
- Use computational thinking to break down problems, and algorithmic thinking to build logical solutions to real world problems.
- Generalise algorithms so that they can be reused again to solve similar but different problems.
- Be able to apply established algorithms to solve common problems such as searching and sorting data.
- Be able to recognise and use data types appropriately.
- Understand the functions of an operating system.
- Recognise different cybersecurity threats, why they happen and how to prevent them.

Cognitive science underpinning lessons and their structure

- Cognitive Load During Problem Solving. Sweller, J.
- Teach like a champion 2.0. Doug Lemov
- Explicit direct instruction. John Hollingsworth.
- Shut down or restart. The Royal Society 2012
- After the Reboot. The Royal Society 2017
- Teachers Vs Tech. Daisy Christodoulou
- Mindset. Dr Carol S Dweck
- Computer Science Education. Sue Sentence, Erik Barendsen and Carsten Schulte
- Teaching Computing. Carl Simmons & Claire Hawkins
- Teaching computer programming with PRIMM. Sue Sentence, Jane Waite and Maria Kallia