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.

Computer Studies

Intent

All students have the right to have rich, rewarding and deep learning experiences that balance as many aspects of computing as possible. With technology playing such a significant role in all aspects of society today, we believe computational thinking is a skill everyone must be taught if they are to be able to actively and positively participate in what is increasingly becoming a “digital first” world. A high-quality computer studies education equips students to use analysis and computational thinking as well as creativity to understand and change the world. Computer studies has deep roots and links with many subjects both in education and the professional arena – from the core STEM subjects to business, media and the arts and provides insights into both natural and artificial systems.

Skills

Computer studies is more than programming; it enables students to look at the world through a critical digital prism – of discovering what is possible – and what could be possible in the future. Computers have fundamentally changed our society – for better and worse – and it is our role as educators of computer studies to enable students to be a positive and effective part of that society. Students are encouraged to use techniques such as PRIMM (Predict, Run, Investigate, Modify, Make) which is a strategy that can be employed across a variety of disciplines. Computer studies also promotes resilience – programming is as much about the mistakes made as the successes gained.

Purpose of Study

Our computer studies education equips students to use computational thinking and creativity to understand and change the world. The core of computer studies is computer science, in which our students are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. Computer studies also ensures that students become digitally literate - able to use and express themselves - safely - and develop their ideas through the digital medium.

Aims

Our aim is to ensure that all students:

- can both understand and apply fundamental principles and concepts of computer science – for instance computer systems, data representation, algorithms and programming
- can analyse problems in computational terms using decomposition and abstraction techniques, and that they have many practical experiences of writing computer programs in order to solve problems – in both event-based systems and scripted general purpose languages
- can evaluate and apply information technology, including the many new or unfamiliar technologies that will appear during a student’s time at school
- become responsible, competent, confident and creative role models in digital technology

Assessment

In Key Stage 3 students are assessed primarily using moodle, Richard Lander's VLE. Each lesson is fully resourced in moodle and at the beginning of each lesson is a starter quiz that reflects on the previous lesson or in the case of years 8 and 9 the previous lesson and the previous years. The data from these assessments is used to identify gaps and appropriate action is taken. Unless there is a very clear gap in knowledge for a particular cohort changes are likely to only occur the next time a topic is visited. Where a clear gap for a class or year group is identified by the teacher then this is addressed within the topic lesson cycle. At the end of a topic a topic review is carried out and changes made for the next academic year, when the topic will be visited again and built on.

In Key Stage 4 each topic is assessed via the moodle VLE and the data from assessments is used to dictate the DIT allocated to each topic. As the specification is completed early in year 11 this data can also be used to identify revision opportunities for students and specific groups. In addition to moodle, students sit regular paper-based assessments as the course is ultimately assessed via written examination.

Coding knowledge at Key Stage 4 is carried out via moodle or third party coding IDEs and is used in a more formative way to provide ongoing support for programming knowledge.

Rationale

In Key stage 3 our year 7 students are taught key foundation skills on the use of the digital technology they will engage with throughout their time at Richard Lander. They will also be taught about the roles and responsibilities of being a responsible digital citizen. Students will then follow the same core strands – building on prior learning from each year to scaffold more complex principles. Our aim at Key Stage 3 is to cover:

- Computer Systems
    - Hardware - including processors, the fetch-execute cycle and the Von Neumann System Architecture
    - Software – system, utility and application software
    - Networking – both local and the internet
- Data Representation
    - Binary and why it is used
    - Hexadecimal and its use in engineering and creative art
    - Image, Sound and Character representation in computers
    - Encryption and Compression
- Computational Thinking
    - Decomposition – breaking a problem down
    - Abstraction and pattern recognition
    - Algorithmic design – both flow diagram and pseudocode
- Programming
    - Use of graphical, event-based languages to solve problems and create basic models (eg Microbit, Scratch)
    - Use of textual, scripted languages to solve more complex problems and create solutions that can be applied to a variety of contexts
- Digital Citizenship
    - The role of a digital citizen
    - How to identify, report and avoid unwanted communications
    - The ethics of digital technology
    - The environmental impact of digital technology
- Projects

- The use of creative and computational design to produce an extended piece of work – either a digital game, project using a physical interface (microbit) or a business proposal\pitch using information technology (eg productivity software)

At Key stage 4 students are taught in the same sequence as Key Stage 3 but in much greater depth. Students will undertake programming\computational thinking lessons alongside their computer systems lessons and wherever possible practical applications of theoretical principles are explored – for example the use of binary in the production of characters, sound and images. Students will also learn about the ethical, legal, cultural and environmental impact of digital technology, gaining an understanding of how digital technology can have both positive and negative impact on all these areas.