Introduction

By exploring the challenges faced by pioneering 20th century computer scientists and designers, an insight is provided into why and how computers are designed and work in the way they do. The intention of the curriculum is to both explore and try to answer the same questions that these pioneers had so as to stimulate an interest in and encourage a passion for Computer Science and ICT. These fundamental questions are:

- How can we control computers?
- How do we store and represent data?
- How do we enable computers to communicate?

Intent
At KS3 the aim is allow students to gain an understanding of these core concepts so a successful transition to KS4 can be made: • The use of hardware and software to control computers – the hardware and software components of a Computer System. • Data representation and storage – the use of binary as a foundation to store and represent numbers, letters, images and sound. • The design and implementation of computer programs to solve problems using computational thinking whilst applying both visual and text-based programming techniques. Programming techniques include the use of variables, constants, inputs, outputs, data types, casting and the three constructs; Sequencing, Selection and Iteration. • The use of computers to communicate including network types, network topologies, network advantages and disadvantages, purpose of hardware, IP and MAC addressing, the Internet and wireless networks. In addition to the skills above students should have the required knowledge to be responsible digital citizens and to be aware of potential vocational opportunities within the ICT industry, this includes knowledge of: • The benefits, opportunities and transferable skills that Computing can provide. • The risks and challenges that technology creates today and may pose in future, to both the individual and society, and how these can be mitigated. In KS4 the aims are to: • Further develop and enrich the knowledge that has been established in KS3 to ensure students achieve their potential in the completion of the Computing GCSE. • Challenge students to solve complex problems through creating sophisticated programs that emulate industry standards. • Encourage the use of metacognitive skills by students to manage, monitor and reflect upon their own learning. In KS5 the aims are to: • Significantly extend upon the knowledge that has been developed in KS4 to ensure they achieve their potential at A-level. • Develop the Computing and ICT knowledge needed for further education and a successful future in the workplace. • Further establish and develop metacognitive skills to encourage greater independence in how progress is monitored and managed.

Implementation

During KS3 the students have two lessons over a two-week timetable. To enable students to consolidate the Computing knowledge and skills contained within the KS3 curriculum a model is used that spirals over the course of the whole Key Stage. The same topics are revisited in years 8 and then 9 and knowledge is consolidated and then extended upon. The intention is that students have a secure knowledge of concepts introduced at KS3 that will provide a good foundation for progress at KS4.

In the majority of lessons there is a retrieval focus, this will review knowledge that has been acquired in the previous lesson. In addition to this each unit contains two dedicated knowledge retrieval lessons, one will focus on the learning that has taken place in the current unit and the other will focus on the knowledge that has been acquired in the previous unit. Assessments reflect this and build upon each other so one assessment will not focus on just that one topic but also on the previous one. In each KS3 year students will also complete an end of year assessment that combines all topics studied in that year. The use of on-line resources supports tasks completed in lessons and knowledge retrieval. These include *Quizlet*, an interactive on-line virtual flashcard system, that is used within all key stages. This allows students to develop a familiarity with tier three terminology. For each different topic a set of key words has been created that can be accessed and used within the interactive games and challenges that the site contains. At KS4 and KS5 additional platforms such as *Smart Revise*, *Isaac* and the *Craig n Dave* website are used. These contain many home tutor videos, KS4 and KS5 students are encouraged to use these as part of a 'flipped learning' approach and in order to revise before assessments.

End of topic and exam assessments at all key stages are centred around the student. At KS4 and KS5 students are expected to perform an active role in analysing the assessments they complete in order to develop a self-awareness of how to improve their knowledge. This is completed through a feedback pro-forma through which students identify areas they have performed well in and in which further development is required. Once the necessary knowledge and skills for improvement have been acquired questions and tasks on these areas are repeated.

Of equal importance is the necessity for students to be responsible digital learners that are aware of the risks that need to be mitigated when using technology. This is why cyber safety is a topic that is revisited at multiple times during the academic year. A lesson that focuses on cyber safety is taught at the beginning of each term in addition to activities as a whole school that revolve around the celebration of Safer Internet Day each February. This is consolidated by students completing Cyber Safety tasks using the Inspiring Digital Enterprise Award (iDEA) and Cyber Explorer websites, on-line programmes that help young people to develop digital, enterprise and employability skills.

Literacy within Computer Science and ICT as a discipline

The goal of using literacy skills in Computing is to foster a deeper conceptual understanding of the subject. The specific literacy demands placed upon students in Computer Science and ICT include:

- Specificity and abstractness of Computer Science vocabulary and acronyms not seen regularly in other subjects (e.g. ASCii, topology, defragmentation, lossy)
- Atypical meanings for more common words (e.g. function, selection, iteration, procedure, accumulator, driver, register)
- Understanding of command words when responding to open questions
- Significant variety of related Computing terms and acronyms

In order to ensure students are equipped with the specific disciplinary literacy knowledge pertinent to Computing, the implementation of the intended curriculum ensures teachers of Computing have a shared pedagogy. Here, key definitions are routinely embedded into lessons, command words are explicitly discussed and deconstructed for understanding, open-ended questions are frequently posed and students are encouraged to develop an understanding of and use tier 2 & 3 vocabulary.

Year	Curriculum Title	HT1 topics	HT2 topics	HT3 topics	HT4 topics	HT5 topics	HT6 topics
7	Yr 7 Computer Science	Introduction to the school network and Cyber Safety - password security and personal data 7.1 - Components of a Computer System unit	Introduce iDEA vocational course 7.2 - Data Representation unit	Cyber Safety - safe and appropriate use of social media 7.3 - Visual Programming unit (Microbit)	iDEA vocational course 7.4 - Textual programming unit (Python)	Cyber Safety - fake news 7.5 - Networks	Revision for End of Year test 7.5 - Networks continued.
8	Yr 8 Computer Science	Introduction to the school network and Cyber Safety - password security and personal data 8.1 - Components of a Computer System unit	iDEA vocational course 8.2 - Data Representation unit	Cyber Safety - safe and appropriate use of social media 8.3 - Visual Programming unit (Scratch)	iDEA vocational course 8.4 - Textual programming unit (Python)	Cyber Safety - fake news 8.5 - Networks	Revision for End of Year test 8.5 - Networks continued.
9	Yr 9 Computer Science	Introduction to the school network and Cyber Safety - password security and personal data 9.1 - Components of a Computer System unit	iDEA vocational course 9.2 - Data Representation unit	Cyber Safety - safe and appropriate use of social media 9.3 - Visual Programming unit (Scratch)	iDEA vocational course. 9.4 - Textual programming unit (Python)	Cyber Safety - fake news. 9.5 - Networks	Revision for End of Year test. 9.5 - Networks unit continued.
10	Yr 10 Computer Science	1.1.1 - System architecture including Computer Systems and the CPU 1.1.2 - CPU Performance	1.2.1 - Primary storage 1.2.2 - Secondary storage 2.2 - Selection (Python)	1.2.3 - Units and number systems 1.2.4 - Data storage (Images and sound) 2.2. – Selection and Iteration (Python)	1.2.5 - Compression 1.3.1 - Networks and topologies 2.2. – Iteration (Python)	1.3.2 - Wired and wireless networks, protocols and layers 2.2 – Subroutines (Python) Revision for end of year exam	1.4 - Network security 2.2 - Lists and arrays

		1.1.3 - Embedded Systems 2.2 - Inputs, Variables, Outputs, Mathematical Operators, Data Types (Python)					
11	Yr 11 Computer Science	1.5.1 - Operating systems 1.5.2 - Utility software 2.2 - Selection (Python)	1.6.1 - Ethical, legal, cultural and environmental impacts 2.2. – Iteration (Python) 2.2 – Subroutines (Python) 2.2. knowledge retrieval of programs 1 to 6 using Python (input/output functions, variable assignment, selection and iteration)	2.4 - Boolean logic 2.5-programming-languages-and-IDEs 2.2 - Lists and arrays (Python)	2.1.3 - Searching and Sorting Algorithms 2.2. 3 - Additional programming techniques 2.3-producing-robust-programs 2.2 - Traversing Lists and arrays	Revision for final exams	
13		1.3.3 Networks 1.3.1 Compression, Encryption and Hashing 1.5.1 Computing related legislation 1.5.2 Moral and ethical Issues	Revision for mock exam 1.3.4 Web Technologies 1.4.1 Data Types	1.4.3 Boolean Algebra 1.4.2 Data Structures 2.2.1 Programming techniques incl.OOP 3.1. Analysis of the problem	3.2 Designing the solution 2.3 Algorithms 2.2.1 Programming techniques incl.OOP 3.3 Developing the solution	3.4 Evaluation of the solution Revision for final exams	