ICT Long Term Plan 2020-21

Why study ICT? - Computer Scientists are needed in the digital age: since we are living in the digital age, computers and an understanding of programming are required everywhere. Computer scientists design, develop and apply the software and hardware for the programmes you encounter in everyday life.

There was a time before computers ever played a role in our lives. The exponential growth in technology has seen in the past ten years the emergence of Twitter, Facebook, smart phones, wireless communications and many other technological advances in fields such as medicine and robotics. At the current rate of growth, by 2021, the technological landscape and its influence on our daily lives will be unimaginable. Therefore, when it comes to thinking about all the potential avenues of study you could choose from, computer science is always worth considering.

Aims - To provide and exciting hybrid (ICT/Computer Science) curriculum by giving our students the opportunity to gain knowledge and develop skills that will equip them for an ever changing digital world. Knowledge and understanding of ICT and Computer Science is of increasing importance for children's future both at home and for employment. Our curriculum focuses on a progression of skills in digital literacy, computer science, information technology and online safety to ensure that children become competent in safely using, as well as understanding, technology. These strands are revisited repeatedly through a range of themes during children's time in school to ensure the learning is embedded and skills are successfully developed. Our intention is that Computing also supports children's creativity and cross curricular learning to engage children and enrich their experiences in school.

I want students to be creative (Emphasis particularly given to design and creation) and express their ideas using the latest technological software to prepare them for the world. Having knowledge of how Computer systems work and developing computational skills is an essential part of the IT industry.

Rationale for how the curriculum has been sequenced in ICT/Computer Science- We at Shenley, pride ourselves on offering innovative, practice-based tools to promote excellence (Exceptional knowledge and application of programming languages such as using python to develop complex algorithms are key fundamentals that are still used in the industry today) and want our students to take pride in their work (Excellent Presentation in books and taking ownership of their learning is not a chore but a habit).

The more technical side involves principal areas of study within Computer Science, which include computer systems and networks, security, a programming language and theory of computing.

Our whole curriculum is shaped by our school vision which aims to enable all children, regardless of background, ability, additional needs, to flourish to become the very best version of themselves they can possibly be. We teach the National Curriculum, supported by a clear skills and knowledge progression. This ensures that skills and knowledge are built on year by year and sequenced appropriately to maximise learning for all children.

At Shenley, we want to encourage our students and teachers to be greeted by a quote from Aristotle. "We are what we repeatedly do. Excellence, then, is not an act but a habit." This idea is 'central' to creating a culture of excellence at a classroom level and to complement Shenley's presentation policy (A student's textbook should not be about factual information; n and figures, but should have its own identity, progress and development).

Overall Curriculum Objectives (*National Computing Curriculum*)

(1.1) design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

(1.2) understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem

(1.3) use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions

(1.4) 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]

(1.5) understand the hardware and software components that make up computer systems, and how they communicate with one another and with other system.

(1.6) understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits.

(1.7) undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.

(1.8) create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability.

(1.9) understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns.

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In year 7, students study digital literacy, as focus is to develop practical skills in the safe use of ICT and the ability to apply these skills to solving relevant, worthwhile problems for example understanding safe use of internet. In addition, effective searching methods are taught to encourage students to search for information in a safe manner taking, while reminded of copy right infringement. Students explore how hardware and software interact with each other to form a computer system. In computer science we teach children to understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. Also to analyse problems to computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. We also teach a progression of Computing vocabulary to support children in their understanding.

	Digital Literacy + IT	**Computer Systems- Hardware**	**Algorithm Design (NEW)**	**Data Representation**	**Introduction to Graphical Programming and Gaming**	**Introduction to Text-based programming**
Year 7	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	Access to school systems and File management.	Input Output and Process model.	Using decomposition and abstraction methods to solve problems.	Data entry and formatting techniques in spreadsheets.	Using graphical programing techniques in scratch to create 2D/3D shapes.	Introduction to IDE environment and creating strings in python.
	Introduction to cloud based systems and email.	CPU- structure + characteristics.	Designing algorithms using flow charts Designing algorithms using Pseudocode	Using formulas and functions to calculate different scenarios.	History of Gaming.	Using text-based programing techniques in python to create 2D/3D shapes.
	Social Networking- Online Safety.	Memory- Ram and ROM.		Spreadsheet modelling exercise based on profit and loss.	Fundamental Gaming development in Scratch(i).	Using loops in python to create 2D/3D shapes.
	Searching the web	Types of storage devices.			Intermediate Gaming development in Scratch(ii).	
	MS Word- tools.				Advanced Gaming development in KODU.	
	Ms PowerPoint- tools.					

In year 8, students further develop their understanding of different types of computer systems and how an operating system manages both hardware and software. Students will understand that data is a collection of raw facts whereas information is a collection of facts organised to give context. Students expand on their knowledge with performing algorithmic and binary calculations and observe how data is processed in the CPU. Programing techniques are developed further with the addition of 2D and 3D lists and being able to write in and out of files. Students use the Systems Life Cycle to design, implement and test a working ICT solution.

	Computer Systems- Software	**Webpage Design (NEW)**	**Algorithm Development (NEW)**	**Data Representation**	**Programming Techniques- Basics**	**Taking Programming Further**
Year 8	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	Types of Embedded Systems used in the technological world and their uses.	Introduction to HTML tags and elements.	Programming basics- Data Types and Operators	Introduction to Binary.	Introduction to string manipulation and variables.	Using functions and procedures in python.
	The role of operating system with in a computer system.	Using hyperlinks between internal and external webpages.	How variables and constants are used in algorithms.	Converting to Denary to Binary.	Using integers, floats and in python.	Using 1 dimensional lists to display, alter and delete data.
	Software- types and uses.	Creating LISTS and forms using Ms Forms.	Using strings in algorithm design.	Converting from binary to denary and binary addition.	Introduction to selection- use of statements.	Using 2 dimensional lists to display, alter and delete data.
	How data is converted into information.	Using CSS to format webpages.	Program Flow		Using Loops within a line of code.	Writing in and out external files.

In year 9, students are introduced to how the internet is connected through a network of computers. The result is a mass of cables, computers, data centres, routers, servers, repeaters, satellites and Wi-Fi towers that allows digital information to travel around the world. The web is a way to view and share information over the internet. That information, be it text, music, photos or videos or whatever, is written on web pages served up by a web browser. Students will look at how systems are protected from cyber-attacks and viruses through strict legislations to prevent computer miss-use and prevent access to personal data. Students explore how data is organised and retrieved from servers with the use of SQL (Structured Query Language).

	Networks and Connectivity	**Ethical issues involving ICT and Security**	**Algorithm Search and Sort (NEW)**	**Data Representation**	**Databases**	**MySQL and Java Script (NEW)**
Year 9	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	The role of different network components that are used to connect to the internet.	Cyber Attacks- External threats that can damage a computer system	Searching algorithms using linear search methods.	Understanding that all images are represented as strings of 1s and 0s.	Introduction to relational databases.	Creating tables in MySQL and entering data.
	Local Area Network and Wide Area Network.	Network security features that protect from cyber-attacks	Searching algorithms using binary search methods.	Understanding that digital sound can be represented as stream of 1s and 0s.	Field names and datatypes make up a table structure.	Searching for data using MySQL commands.
	Introduction to Network Topologies	Different Legislation policies that protect users from computer miss use	Sorting algorithms using bubble sort.	Introduction to Logic Gate calculations. [AND, OR, NOT]	Searching and sorting data in a database.	Introduction to JavaScript.
	How the World Wide Web is linked to the Internet.	Health and Safety when using computer equipment.	Sorting algorithms using merge sort.		MySQL and its practical uses.	Using JavaScript with HTML.