Computer Studies (Information Technology and Computer Science) curriculum

The Vision for all our students who study ICT and Computer Science

Develop learner's knowledge, skills and understanding through key computational concepts and experience. The KS3 curriculum has been designed to ensure learners have sufficient practical skills and understanding to utilise a computers full potential not just within the subject area but the whole curriculum too. The KS3 curriculum also provides a focus on developing resilient learners who are able to recover from mistakes and effectively solve problems. The topics at KS3 give a basis of knowledge, skills and understanding to allow students to progress onto either ICT or Computer Science at KS4 and will provide exposure to those subjects so that students can make an informed decision on their GCSE choices.

The rationale of the Computer Science KS4 curriculum is for students to develop the mind-set of a computer scientist built upon the foundations at KS3. Learners will have many opportunities to develop their computational skills.

The rationale of the ICT KS4 curriculum is for students to develop the mind-set of an ICT project manager built upon the foundations at KS3. Learners will have many opportunities to develop their theoretical and practical ICT skills through creative project work and a general understanding of computers, digital media and information technology.

Rationale

Our curriculum is based on the key elements of the Computer Studies 2014 National Curriculum

ICT and Computer Science are concerned with the storage, processing, presentation and communication of information by electronic means. This includes the measurement, modelling and control of external events. ICT continues to evolve very quickly and has now become firmly entrenched in many aspects of everyday life, both at home and in the workplace. As ICT and computer systems underpin today's modern lifestyle, it is essential that all students gain the confidence and capability at they need in this subject to prepare them for the challenge of a rapidly developing and challenging technological world.

Following the Computer Studies National Curriculum learning is divided into three strands; Digital Literacy, Information Technology and Computer Science the first table below details how we provide a full coverage for our students. The second table below details the units of study specifically designed to comprehensively cover the 3 strands.

Table 1: The 3 Strands of Computer Studies

Safe	Creative	Effective
Staying safe online	Projects	Problem Solving
Communication	Digital Media	Working to a brief
Collaboration	Programming Design	Technical knowledge
Law and Ethics	Digital solutions	Technical Skills
Cyber-security	Creative thinking	Working effectively

Table 2: KS3 Computer Studies Units of Study

Information Technology	Computer Science	Digital Literacy
Digital Presentation	How computers work	Embedded
Data Handling	Programming	
Data Manipulation	Data representation	
Data Processing	Conceptual Thinking	
	Website coding	

Key Stage 3 Computer Studies unit introductions
As a department we think it is vital before starting each unit of work that every student understands how it fits into the big picture and exactly why they are studying the topic. This is delivered in the classroom and through the department's website in pupil speak. Each class has one teacher for the year and the teaching team follow a consistent scheme of work leading up to GCSE ICT or computing.

Introduction to High School Computer Studies
The internet is a fantastic invention; it can also be quite a dangerous place. By the end of this unit students will have learnt how to operate safely online and will have gained an understanding about the way computer equipment in general is shaping the world we live in. This a crucial and developing area of study that also includes other digital media including mobile app technology. This topic is reinforced every year and also plays a part in the school pastoral programme, tutor time and whole school assemblies. In addition to this all pupils are given a sound grounding in the schools tailored applications.

This is done because pupils join us in year 7 with varying levels of expertise depending upon the feeder primary school they came from. This benefits not just the department but the school in general as all subjects now require digitally literate pupils.

Office skills including: Word, Excel, Access, PowerPoint and Publisher
Microsoft Office or one of its components (e.g., Microsoft PowerPoint, Microsoft Word, Microsoft Excel) is among the top 10 skills required for almost all the job types. In year 7 the department aims to give every pupil a secure grounding in the main MS Office packages through carefully planned actives and teaching.

This bridges any knowledge or skill gaps a pupil might have from their primary provision and importantly provides the foundation blocks for success in KS4.

Computational Thinking

Computational thinking is not only the cornerstone programming today but of problem-solving skill in general. This unit of work gives pupils plenty of opportunities to explore this strand of Computer Science.

By giving KEVI pupils computational strategies and models to follow the purpose is to nurture and develop independent resilient learners that are successful not only in Computer Science but all subjects too.

Programming

Understanding computers and learning the basics of coding helps children to develop an appreciation of how things work. It also teaches them how software engineers use math in order to solve problems in a logical and creative way.

Programming is the cornerstone of the Computer Science curriculum and subjects directly benefiting from the unit of study include: Maths, Science and Design Technology.

Website Coding

The internet is the go too knowledge base of the 21st century with webpages underpinning the entire network. This unit of work gives some insight into how webpages are constructed firstly using compilers and then code itself.

A basic understanding of HTML mark-up code is cited as core skill by many employers as more and more businesses expand onto the web.

How Computers Work/Data Representation

Computers are really cleaver but complicated pieces of kit. By the end of this unit you will be able to recognise the major components within a computer, have a good understanding what their purpose is. You will also know how computers communicate with each other as well as how data is sorted in binary form within the computer. A basic understanding of how computers work and data is represented will be required for the GCSE ICT course with additional knowledge and understanding being required for the GCSE Computer Science course.

Almost every job today and certainly jobs of the future require some technical knowledge. A knowledge of computers and computing software will give applicants a competitive edge over their competitors in the job market.

In Year 9 students get ready to select their options and can chose from GCSE ICT 9-1 (OCR) or GCSE 9-1 Computer Science (OCR) The KS3 curriculum prepares students so they are ready to start these courses with some additional skills that are taught in year 10. These courses provide students with the experience and qualification ready to progress to vocational careers, further and even higher education to a vast range of job sectors. These courses support both ends of the spectrum allowing for higher level project management jobs and more vocational based apprenticeships. Able and talented Students studying either strand of the discipline are encouraged to work in an independent and enquiring manner. This is supported outside the classroom by the subject's website, during lunchtimes and after school support sessions that the department runs every week.

GCSE 9-1 Computer Science (OCR)
Building on our KS3 foundations, the Computer Science GCSE draws from all of the 3 strands detailed above in Table 1. With the full three years we intend to provide all students with a strong subject foundation from where learning can be enriched and enhanced; leading to exam success for all our students.

Problem solving skills will be enhanced through a series of enriched programming topics. Formal programming used in exams will get greater emphasis. Students will not simply learn to program computers in one language such as Python, or VB.net, rather, they will be knowledgeable of programming itself. In addition to this, students will be learning how to rationalise their designing and decision in report format.

Deep understanding of all computer sciences core concepts will be achieved over time through class work and meaningful research.

Qualification topics
- Understanding of what algorithms are, what they are used for and how they work; ability to interpret, amend and create algorithms.
- Understand the requirements for writing program code.
- Understanding of binary representation, data representation, data storage and compression, encryption and databases.
- Understanding of components of computer systems; ability to construct truth tables, produce logic statements and read and interpret pseudo-code.
- Understanding of computer networks, the internet and the worldwide web.
- Awareness of emerging trends in computing technologies, the impact of computing on individuals, society and the environment, including ethical, legal and ownership issues.

GCSE 9-1 Information Technology (OCR)
Again building on our KS3 foundations, the Information Technology GCSE draws from many of the 3 strands detailed above in Table 1. With the full three years we intend to provide all

students with a strong subject foundation from where learning can be enriched and enhanced; leading to exam success for all our students.

Students will learn about tools and techniques for use in different digital hardware and software technologies, and how these can be integrated to create digital solutions to manage and communicate data and information. They will also be taught what data and information are and the legal, ethical and moral considerations when using technology to gather, store and present data and information, and how to mitigate the risks of cyber-attacks. Through this qualification they will be able to select and use the most appropriate technology safely and effectively, to complete a variety of data management tasks.

Qualification topics
- Understand the tools and techniques that can be used to initiate and plan solutions
- Understand how data and information can be collected, stored and used
- Understand the factors to be considered when collecting and processing data and storing data/information
- Understand the different methods of processing data and presenting information.
- To be able to initiate and plan a solution to meet an identified need
- To be able to import and manipulate data to develop a solution to meet an identified need
- To be able to select and present information in the development of the solution to meet an identified need
- To be able to iteratively review and evaluate the development of the solution.

<u>SMSC</u>
Spiritual development in Computer Studies
Students are continually reflecting on their own lives and the lives of others as they look at various ICT/Computing case studies. Students debate and formulate their own set of values and beliefs through case studies as they share their own experiences.

Computing provides opportunities for reflection of awe and wonder about the achievements in ICT today and the possibilities for the future. ICT lets students have the opportunity to reflect on how computers can sometimes perform better in certain activities than people. To promote students' spiritual development, their sense of self and their will to achieve, the computing department continually takes the opportunity to praise students for their contribution in lessons.

Moral development in Computer Studies
Through real life case studies, students consider issues surrounding the misuse and access rights to personal data. The use of case studies in computing encourages students to draw conclusions through evidence rather than their preconceptions whilst allowing the students the time to reflect on the origins of their own personal perceptions of a topic.

Students consider the effects of social networking and the consequences of cyber bullying; they also consider the legal aspects of ICT including the Data Protection Act, Computer Misuse Act and Copyright legislation. They consider the implications of file sharing and

downloading illegally and the penalties for engaging in this type of activity. Students also consider the moral aspects of developments in technology including the use of CCTV cameras, Speed Cameras and Loyalty Cards to balance up people's rights and responsibilities.

Computing helps students to explore aspects of real and imaginary situations and enables them to reflect on the possible consequences of different actions and situations. It can raise issues such as whether it is morally right to have computer games whose aim is killing and violence, and whether it is fair that some people in this country and in other countries cannot use the internet.

Other moral issues surrounding the topics of e-waste and the digital divide are also explored through case studies. The use of case studies in ICT encourages students to draw conclusions through evidence rather than their preconceptions whilst allowing the students the time to reflect on the origins of their own personal perceptions of a topic.

Social development in Computer Studies
As part of the computing curriculum students are taught to think and produce work that reflects the needs of diverse audiences within our community and the wider community. As students develop their skills in a range of software they are challenged to work in groups to find solutions whilst developing respect for the ideas and opinions of others in their team. This is particularly prevalent in the design phase of tasks given. In addition students are encouraged to develop their team working skills through collaborative work and research.

The students also explore the concept of teams and the roles that individuals have to play. Computing can also help all students to express themselves clearly and to communicate. As students' progress through their learning they will consider more complex social needs and are encouraged to research and work collaboratively to find appropriate solutions to issues that may affect particular groups within society.

Cultural development in Computer Studies
Computational thinking encourages students to develop and explore their problem solving skills. Computing Empowers students to apply their ICT and computing skills and to gain knowledge of how programming links between subjects for instance maths.
Students explore how developments in technology have changed our culture, particularly the rise in social networking sites and the ability to communicate instantly across National and International borders. Computing involves the breaking through of linguistic and cultural barriers. It is possible to e-mail or chat across the world and to word process in the mother tongue.

Whilst studying various aspects of computing students are asked to reflect on how different cultures are portrayed on the internet and why or who is portraying them in this way. Students are also challenged to think about how differing cultures access and use the internet and what implications this has on the individual and the culture.

British Values in Computing in Computer Studies

At King Edward VI, we seek to actively promote the fundamental British values of democracy, the rule of law, individual liberty, and mutual respect and tolerance of those with different faiths and beliefs. These values are explicitly embedded in schemes of work and lesson planning with active reference made to these values in the relevant context during lessons. Examples from the SOW include, but are not limited to: Exploring democracy through class votes and investigating how technology is used as part of the democratic process, for example census data, online polls and petitions, and the electoral register. Investigating how the rule of law applies to computer users in a range of contexts, with reference to specific legislation relating to copyright, cybersecurity, personal data and privacy, electronic communication, hate crimes and harassment, surveillance, workplace health & safety, and environmental protection.

Exercising individual liberty and learning the difference between "freedom to" and "freedom from" in the contexts of; the above legislation, BBFC and PEGI media ratings, acceptable use policies, and explicit or implicit codes of conduct in a range of settings including home use of technology and online activities. Promoting mutual respect and tolerance by exploring ethical and cultural issues such as; the digital divide, checking content for factual errors and bias, cyberbullying, acceptable limits of personal liberty as detailed above.

Concept of cultural capital
The use of computers in everyday life is very important and increasing all the time. We challenge and evaluate the use of technology not only in our lives but in the workplace too regardless of the type of work undertaken. It's important that we offer a broad computer science curriculum to students to enable them to embrace existing and future technology to help, support and guide them in their chosen career's. Student's learn the essential skill of problem solving using computational thinking and systems, a skill which can be transferred to many subjects across the curriculum as well as learning how to design, develop, analyse and implement applications. They will understand the ethical, social, moral and legal aspects of computer systems that will better equip them with different business and social contexts.

Character education – looks to implement the values and virtues into our curriculum, both examination and non-examination, at every available opportunity.
Active Communities – include leadership opportunities, mentoring, wellbeing, local and national competitions.
Equality – promoting of British Values within lessons when opportunities arise, treating all people the same no matter the ability, sex and race.
Progression – students are given regular advice on their career pathways, this includes options and activities outside of school.
Respect, Safety & Wellbeing – this is where we aim to give students the chance to develop their mental and physical wellbeing through active lessons. In ICT lessons there is a focus on mental well-being and issues like Cyber-bullying, internet Safety and the law are an important part of students have the knowledge needed to protect themselves and others.

Cross-curricular opportunities, literacy and numeracy
In ICT and Computer Studies there are numerous opportunities to develop numeracy and literacy. ICT and Computer Studies is a literacy rich subject with many key terms and words that are specific to it. We strive to the students to develop a subject specific knowledge of a vast number of words and terms. Students have to write in an analytical and evaluative way. The teaching staff make use

of subject specific support cards and mats to help students of all abilities. Maths and Science are an important part of Computer Studies and ICT from basic programming to using formulas in spreadsheets. There are strong cross-curricular links with Science, and Design and Technology. Students develop knowledge of and skills in Desktop publishing, layout design and image manipulation. Logic gates and core programming skills link to the science curriculum. The Department works closely with Science and DT to help run a KS3 Stem.

Careers (Gatsby benchmark 4 coverage)
The Computer Studies curriculum opens a wide range of opportunities. Students will develop IT competencies that will allow them to be both effective learners and provides key employability skills. The computer science element of the curriculum prepares students for further academic study of the way computer systems work and also develops problem solving skills that will be essential when pursuing subjects such as maths and engineering. It could lead onto careers including cyber security and computer game design. The digital media strand of the curriculum can lead to further study in this area or directly into employment and/or apprenticeships.

We are proud of our students and their success
The Computing Studies curriculum at King Edward VI is designed to engage and enthuse so that all students have positive outcomes. Students will be equipped with traits that reflect resilient learners. We will know that this is true as we are delivering a high standard of education, quality assured through qualitative and quantitative measures such as:

- Attainment and Achievement outcomes
- Observing lessons and scrutinising planning
- Standards of work submitted
- Student voice
- Destination data
- Attendance data
- Behaviour data

Computer Science

	2017	2018	2019	2020
Percentage of students achieving 4+	77% (C+)	67%	35.7%	94.7
Percentage of students achieving 5+	30% (B+)	33%	7.1%	47
Percentage of students achieving 7+	15% (A*/A)	17%	-	11

ICT

	2017	2018	2019	2020

Percentage of students achieving 4+ / Level 2 Pass+	54% (C+)	62% (C+)	53.1% (L2 Pass)	70%
Percentage of students achieving 5+ /Level 2M+	24% (B+)	33% (B+)	-	23%
Percentage of students achieving 7+ / level 2D+	9%(A*/A)	17% (A+)	-	7%