



Computing Curriculum

Statement of Intent, Implementation, Impact

Intent

Computing education equips pupils to understand and contribute to the ever-evolving world through logical thinking and creativity. The core of computing is computer science, in which pupils are taught the principles of information and computation, and how digital systems work. Computing equips pupils to use information technology to create programs, systems and a range of media. It also ensures that pupils become digitally literate. This includes the ability to use, express themselves and develop their ideas through information and communication technology. We are conscious of our responsibility to **prepare pupils for the future workspace** including jobs that may not yet exist. We do not merely teach pupils to use specific software packages; rather we teach fundamental principles and relate these to the evolving needs of the world. As pupils increasingly live their lives seamlessly on and offline, we teach them about the challenges, dangers and exciting opportunities offered by the online world.

Computing consists of **three strands** to enable pupils to make progress across KS3 and KS4: **information technology, digital literacy and computer science**. Although we carry out a detailed review of our curriculum towards the end of each academic Year in preparation for the next, we **continuously review** and **monitor** the suitability of our curriculum and make necessary adjustments throughout the Year. We have a high quality and established curriculum which has been developed, tested and modified over a number of Years yet we constantly monitor our provision and make continual relevant changes. These are based upon identified needs from a variety of sources such as the most recent DfE guidance such as the 'Teaching online safety in school' document (June 2009), teacher identified needs or even suitable suggestions from the pupils themselves. Wherever possible we go **beyond the basic requirements** of the **Computing National Curriculum** to meet the needs of our high achieving pupils (who at Broughton constitute a much higher percentage than the national average) whose curiosity and thirst for knowledge is not curtailed by statutory requirements. At the same time, our curriculum meets the needs of **all pupils** across the ability range through supporting and inclusive lessons. More specifically, we cater for and **meet the needs of SEND and disadvantaged pupils** through differentiated resources available on the VLE and providing access to Computers and resources outside of class time (before, after school and during breaks). In addition, we provide our **pupil premium** KS4 pupils with revisions guides and work books free of charge. Pupils who wish to extend and continue classwork are aided in their pursuits by allowing them to borrow equipment such as Microbits.

Each module taught throughout KS3 has clearly outlined '**key knowledge**' and '**practical application**' skills. These are shared with pupils at the start of each module and are reviewed by the pupils again at the end of the module so they are able to self-assess. Our curriculum is **coherently planned and sequenced** such that work in each new module builds upon what has been taught previously. Modules are strategically interspersed to aid long-term recall based upon research theories such as spaced learning. All this is geared towards providing pupils with solid Computing and digital skills needed across their various curriculum subjects by the end of KS3. Those who wish to continue Computing at KS4 have a head start since relevant sections of the KS4 curriculum are woven into our KS3 curriculum where appropriate.

Computing allows pupils to repeatedly practice key knowledge and skills learnt in Mathematics in a variety of scenarios whether that is through the use of spreadsheets or the underlying computation behind their

computer programs. Computing also aids pupils' Literacy skills through a myriad of opportunities from the use of word processors to capturing, recording and analysing client requirements and beyond. We also run well attended and successful coding and computing clubs after school.

Keeping in line with the school's vision and our aim to facilitate **cultural capital**, pupils are regularly taught how to take into account accessibility and diversity of our communities when creating and designing their computing products. Not only does this facilitate pupils meeting moral responsibilities but also consider niche economic opportunities as a secondary by-product. All pupils can routinely **access computers and expertise** at set times such as break, lunch and afterschool Computing workshops, which are staffed by our specialist teachers. **SEND and disadvantaged pupils** are especially **encouraged** to access these facilities when a need is identified. We have been **building our links with FE and HE institutes** and KS4 Computer Science pupils take part in the Alan Turing Live Cryptography competition at the University of Manchester. This Year we will also send some of our **AGT pupils** (including disadvantaged AGT) to a Computing masterclass at Runshaw college. AGT pupils are also encouraged to take part in national competitions such as the Alan Turing and CyberFirst by GCHQ. Digital Leaders are appointed in lower school to encourage extra-curricular computing. Girls are targeted through Ada Lovelace based lessons by an outsider provider in Year 7.

Implementation

The computing curriculum is delivered through 1 hour lessons per week in Year 7 and 8 and 1.5 hours a week in Year 9. We teach our Year 9 pupils twice a week for 60 minutes each. The remaining 0.5 hours is made up by Business, which is also taught by the computing teacher. We have a successful and long established amalgamation of the two subjects in Year 9 such that the Business modules are delivered by making full use of computing systems and practices. Though we have previously had a small number of lessons at KS3 covered by none specialist staff, next Year (2019-2020) all KS3 and KS4 lessons will be delivered by the two specialist computing teachers with one Year 9 class taught by the head of Business. There are six Year 7 classes with approximately 31 pupils each. In Year 8 and 9 the pupils are divided across eight classes allowing much more flexibility in meeting the needs of individual pupils. Since pupils are taught in mixed ability groups, this model of reduced class sizes is especially appreciated by **pupils requiring extra support** as well as our **more able pupils** who are provided further opportunities of stretch and challenge. The department makes extensive use of the school VLE in helping to meet the needs of both sets of pupils, in addition to those in between.

The Computing curriculum is exclusively taught by two **subject specialists**, both of whom have over a decade of experience in successfully teaching ICT and Computing at Broughton. The new Computing curriculum has brought many challenges and transformed the subject. We have risen to the challenge by successfully embedding and continually improving our schemes of work to ensure we **meet and go beyond statutory requirements**. At KS4 we currently offer GCSE Computer Science, and since the discontinuation of GCSE ICT at the end of the last academic Year, we offer a vocational course: a Certificate in Creative iMedia (a level 1 and 2 qualification). With the teachers being new to both courses they have undertaken some recent CPD to aid in the delivery and to learn from best practice. Teachers use a **variety of adaptive teaching strategies**, including but not limited to, Kagan structures, Lows stakes testing, active learning, interleaving, spacing, modelling, real-time online quizzes and use of mini white boards. This allows us to **routinely check pupils' understanding**. Teachers use marking, assessment and class discussions to identify and correct misunderstandings and ensure that all pupils embed key concepts in their long-term memory. Pupils are provided with numerous opportunities to connect new knowledge and skills and build on prior learning. Industry specialists (Microsoft) come to speak to Year 9 pupils to encourage (especially girls) to take up Computing post KS3.

The structure of our KS3 curriculum is underpinned by fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. These are not merely taught as discrete disciplines but rather they form the basis of various modules strategically interspersed across Year 7 to 9 and beyond. This allows us to **support retrieval** and **spaced practice**. These approaches are well-supported by evidence. As an example, in Year 7, pupils complete small modules on coding, algorithms and problem solving using flow charts in a software package called 'Flowol'. As part of this they study control, logic and abstraction. These concepts are again revisited in Year 8 in three separate modules: scratch programming, coding and controlling a Microbit computer. All three modules are separated with modules exploring other aspects of the computing curriculum. In Year 9 pupils again apply the aforementioned skills whilst studying an extended computer science module. In this module they now implement their computational thinking developed over the previous two Years by coding in text-based programming languages. To further embed the understanding that these **concepts are not confined to a single vehicle** we teach two separate text-based programming languages: Small basic and Python.

Text-based programming requires pupils to demonstrate not only computational thinking but also tenacity and resilience; essential ingredients for lifelong independent learning. We go beyond the requirements of the Computing National Curriculum and teach two languages to stretch our learners who always rise to the challenge.

Likewise, we teach data manipulation through the use of spreadsheets and databases, even though this aspect of the computing curriculum does not feature as heavily as it previously did in the National Curriculum. Pupils study the 'data handling' module in Year 7. This is followed up and extended in Year 8 with the 'Band Manager Modelling' and the 'Safari Park' modules in Year 8. Spreadsheets are again used in the 'Pizza Co' module in Year 9 where pupils record and analyse customer requirements.

Online safety is taught as a discrete module in Year 7 and further age appropriate 'top-ups' are provided in subsequent Years. We also utilise the whole school initiative of reading week and provide computing pupils with extended case studies highlighting important online safety issues which are followed up by class learning activities. Please refer to appendix A for a full layout of our key stage 3 SOW overview. Each of the modules listed here have an associated detailed SOW which includes all supporting learning resources. These are all fully presented on the **school VLE (Firefly)** in a format appropriate for pupils. Other than the teacher, the VLE is the primary vehicle used by our pupils to access the curriculum. All of our modules are clearly set out on the VLE, lesson by lesson with extra enriched content (video, audio, external hyperlinks, quizzes, differentiated worksheets etc.) to provide all of our pupils equal access to the curriculum both within and outside of planned computing curriculum time. Each module is planned such that the intended knowledge and skills steadily build up and are imparted to the pupils.

Teachers foster an enjoyment and curiosity for computing. In Year 9 pupils have the opportunity to investigate an important figure in the history of computing to provide a sense of the bigger picture. In addition to the VLE, we deploy a **range of other software** and technologies to aid teaching and learning. Each one has been carefully selected based upon the underlying research-based benefit. We use a combination of Doodle, Seneca, Kahoot quizzes and other online resources. A **range of teaching and learning strategies** (Kagan structures, interleaving, low stakes tests etc.) are built into our schemes of work.

We are fortunate to be supported by a SLT who understand and share our vision for Computing at Broughton. Investment in computers and associated infrastructure has ensured we have had access to quality equipment and crucially the necessary software needed for us to implement the curriculum at both KS3 and KS4.

Quality Assurance

At the start of Year 7, all pupils complete a **baseline assessment**. This gives us a good understanding of pupils' prior ability. They repeat the test at the end of Year 7 allowing us to measure progress to some extent. At the end of Year 9 all pupils complete an end of Year 9 computing exam. They are then awarded an end of Year level which is compared against their target for the Year.

Although individual pieces of work are marked separately, pupils' work for **each main module** from Year 7-9 is collated at the end of the module and a **teacher-assessed level** is awarded and compared against their target. Pupils work is marked against key knowledge and skills identified to pupils at the start of each module. Samples of work from each teacher are regularly moderated to ensure **standardisation**. At the end of a module, pupils are given **personalised targets** and the pupil carries out some self-assessment. They then set a target for themselves for future work. All this is provided on a feedback sheet which is then sent home and signed by the parent before returning it to their teacher. Because the modules are discrete and interspersed for reasons outlined earlier, some immediate improvements from one module to the next are challenging to assess.

There is a culture of **regular peer and self-assessment**. At the end of substantial pieces of work (identified by the teacher) pupils use purple pens to highlight and make subsequent improvements to their work. **Parents** are also sometimes **involved in the process of formative assessment**. After creating a substantial computing product such as a website, pupils send their work home electronically. As part of their homework, pupils showcase their work to their parents/guardians and elicit recorded feedback which is then fed back to the rest of the class and improvements are made based upon this. Some work, especially lengthier and colour documents, are not printed out but are instead uploaded to the VLE for the teacher to mark. This also helps the environment as we seek to reduce our carbon footprint. Numerous modules at KS3 include a spelling test consisting of key subject specific vocabulary. This is followed up with gap fill exercises giving the pupils an opportunity to use the vocabulary in context.

Pupils are teacher assessed against their targets from Year 7 through to Year 11 and reviews provided to parents three times a Year. Any pupils under achieving are identified and **appropriate interventions** are actioned. We also scrutinise data (ResultsPlus) provided by edexcel for our GCSE Computer Science exam performance topic by topic to ensure we plug any gaps in our teaching and learning at KS4 level.

Impact

The quality of pupils' work in Computing is consistently and routinely of high quality. Pupils largely store their work electronically in organised and properly labelled hierarchical folder structures. They are increasingly using cloud computing (the schools email and 1 drive system) to store and transfer their work securely. They confidently use the schools VLE system since these are routine practices and norms of working for them from the start of Year 7 onwards. Pupils use their **Computing skills across the curriculum** in numerous subjects to effectively research, present and organise their work. They are also able to use their Computing skills to work collaboratively where necessary. Their problem solving skills developed whilst computer programming often build upon their mathematical knowledge and allow them to practice crucial problem solving skills in a different context.

All pupils have the opportunity to choose GCSE Computer Science or the vocational Certificate in Creative iMedia. Typically, a smaller number of pupils (including SEND/Disadvantaged) opt for GCSE Computer Science in line with the national trend. The vocational option, Creative iMedia is a relatively popular choice. The results from a **pupil voice questionnaire** we carried out with our Year 11 computer scientists were very positive. Only one pupil said in hindsight he would not choose the subject again and despite more than 56% of pupils stating that the subject was more challenging than most of their other GCSEs, **68%** of pupils said they have **opted** to study the subject at **A-level** next Year.

Tests scores, especially at KS4 level, show the impact of effective feedback on pupils' outcomes.

Historically the computing department has **performed amongst the top departments** in Broughton in terms of GCSE results. Last Year's Average Point Score (**APS**) compared to pupils nationally at a similar starting point for GCSE Computer Science (26 pupils) was **+0.86** and for GCSE ICT (46 pupils) was **+0.63**. This demonstrates the impressive progress and outcomes for our Computing pupils.

Pupils enjoy Computing and almost all Y10 computer scientists opted to enter the Alan Turing **cryptography competition run by Manchester University**. This involved weekly online challenges, which they often completed collaboratively during a voluntary after school Computing workshop. We followed up by organising a trip for Y10 computer scientists to attend the final live cryptography day competitions at the university. We also had some pupils who voluntarily entered the cyber security competition run by GCHQ. One of our success stories includes a former computer science pupil from only two Years ago who is now employed and trained by GCHQ. It is a source of pride that one of our former pupils is now at the forefront of the UK's defence against cyber security threats.

Our after-school coding, film and animation **extra-curricular club** is open to all pupils and is extremely popular and very well attended by both boys and girls (though there are more boys who attend). We have previously had Computing experts come in voluntarily to support pupils during the coding club and we continue to foster such relationships with 'outside' volunteers. Pupils take pride in their classwork and often take completed work home for parents to see. Comments by parents on the signed assessment sheets at the end of major KS3 modules also often include references to their child having enjoyed studying the modules.

Following a presentation by the head of department to the governors' curriculum and standards committee, the **governors last reviewed** (and approved) the computing curriculum in **January 2019**.

Covid Curriculum

We have added recorded Video lessons on key lessons that isolating pupils have missed on firefly for GCSE CS.

- We have directed pupils who do not have the Python software on their home devices to use the online version of python (online-python.com). This worked well.
- We have embedded Videos on Firefly explaining key parts of lessons e.g. for the Data Handling module for those who are not in class for those modules.
- We used online Seneca (for GCSE Comp Sci) extensively to embed knowledge in the absence of 'in person drilling' during the lockdowns.
- We embedded the use of Kahoot Quizzes for all our KS3 modules for assessment. Typically, at least a mid unit quiz and then an end of unit quiz. Some modules have more quizzes/assessment built in.
- During remote lessons we routinely employ the use of electronic mini whiteboards (in place of physical mini whiteboards) using the online WhiteboardFi software. These can also be saved when needed.
- During remote lessons we routinely employ the use of digital polls to effectively elicit a range of pupil feedback.
- Snip tool (Windows + shift + S) was taught to the pupils so they could easily send in the Teams chat facility to bring individual issues to the attention of the teacher.
- Tasks on Firefly were updated with more instructions when needed to aid pupils learning remotely.
- We reorganised parts of our curriculum (see overview document) so we could cover aspects that were more conducive to remote learning during the lockdown periods and return back to the other modules once back in school E.g. We swapped band manager for website module, since pupils

would not have the specialist commercial software required at home. We also ensured we covered everything we intended, even if some aspects then had to be streamlined.

- Pupils know they can email the Computing staff for any specific needs.
- We used breakout rooms to simulate, as best as we could) small group work during remote lessons.
- Microbit (Y7 and Y8) We shifted this module to the end of the Year, when some restrictions were due to be lifted, to abide by Covid regulations more closely.
- iMedia – Ms CD moved files over and managed the pupil areas in SharePoint on teams.
- Imedia supplementary work on 'Vinyls' was included to hot the Assessment criteria.
- CD added 'prom ticket' work to Year 9 to help with option choices: iMedia.
- Some teachers swapped with the Year 9 Pizza co and programming modules during the January 2021 lockdown, since it was felt that more intrusive interventions were needed with programming so it would be better to cover that when back in school.
- Extra afterschool interventions sessions put on for some Y10 CS and imedia pupils who had fallen further behind as identified by end of unit tests/teacher assessments. This was limited because other pupils were difficult to secure of after school sessions because they are in demand elsewhere eg. the Maths/Eng national tutoring programme which ran after school.
- The Y9 Option videos were produced explaining both of our KS4 courses on offer and made accessible online on firefly.

21st May 2021

Year 7 1.5 * 60 Minute Lesson		Year 8 1 * 60 Minute Lesson		Year 9 2 * 60 Minute Lesson	
Systems Introduction Networks and Email + baseline tests + What is a Computer System	6 Lessons	Online safety	1 Lesson	Online safety (Cyber bullying x1 + Cyber security x3)	8 Lessons
Online safety	8 Lessons	Travel Website	12 Lessons	Computing (CS topics + Python)	18 Lessons
Datahandling Models Spy School & Analysing Data	14 Lessons	Band Manager Modelling	7 Lessons	Pizza Co	22 Lessons
Coding (Hour of Coding) - (Check website/online resource) before hand	2 Lessons	Microbit (If not completed in Y7)	4 Lessons	Comic Strip (Group Work)	6 Lessons
Pivot Stick Animation	3 Lessons	Small Basic Programming	7 Lessons	Revision lessons (x2) + EOY 9 Exam and Exam feedback + Pupil Voice Questionnaire	4 Lessons
Flowol	3 Lessons	Safari Park (Databases section only)	4 Lessons	EXTRA: Prom Ticket	2/3 Lessons
Scratch	8 Lessons	Coding (Hour of coding)	2 Lessons		
Microbit	5 Lessons	Pupil Voice Questionnaire	15 mins		
Baseline test repeated Introduction to programming (Ext)+ Pupil Voice Questionnaire	4 Lessons				
Total (Some lessons lost due to CAT and GL testing at the start of the year)	53	Total	37 Lessons	Total	54 lessons

Overview of Key Stage 3 SOW 2020 – 2021 – Updated 21st May 2021