What Computing looks like at St Mary's Catholic Primary School, Ipswich

Intent

In the ever changing and developing technological world in which we live, it is imperative that children receive a high-quality computing education. Children need to be digitally literate; able to express their ideas and manage themselves in a digital world.

In a world where technology changes rapidly – where programs/software become obsolete in a matter of years – equipping children with computing skills (programming, debugging, systematic problem solving) that transcend the technology is vital.

Implementation

Our Computing curriculum is implemented through our long-term plan, which indicates the areas (Connect – developing an understanding of how to safely connect with others, Code – developing an understanding of instructions, logic and sequences, Communicate – using applications to communicate one's ideas; and Collect – developing an understanding of data, databases and their uses) of the curriculum that are taught in each year group across the year.

The Connect, Code and Communicate units are explicitly taught, one per term in Years 1-6. The Collect unit is taught in a cross-curricular manner, with classes engaging in data and databases in their Mathematics and Science learning.

Online Safety is an element of the Computing curriculum that is taught every half term and is one that is also taught in a cross curricular manner across the school. Every time any computing equipment is used, in any subject, the teacher poses questions regarding how to stay safe online. As a school we also participate in Safer Internet Day.

Key learning in the units Connect and Communicate may also be covered in a cross-curricular manner. In many different subjects across the school, computing equipment is used to amplify and extend learning. For example, children may: conduct some research using search engines in History, create pieces using software in Music, write letters using word processors in Literacy, create instructional videos in Science. We feel it is important that children do not associate computing equipment within the school only with the subject of Computing.

Impact

Children at St Mary's are confident users of hardware and software and are able to safely navigate the online world. Children enjoy Computing lessons and using the computing equipment within their broad and balanced curriculum. The quality of children's understanding is evident through the quality work on Google Classroom and their Computing folders. When speaking to children at St Mary's they will be able to tell you how to stay safe online.

We have subject specialist staff who are passionate in teaching computing and instil independence and growth mind-set into our children. Teachers are able to build upon previous years learning and address knowledge gaps in their future planning. We have good links with the Computing department at the feeder secondary school, so we ensure that every child leaves St Mary's with the crucial skills required to benefit them in secondary school and beyond.

Pedagogy

Computing is a broad discipline, and teachers require a range of strategies to deliver effective lessons. We use the National Centre for Computing Education's 12 key principles that are underpinned by research:

1. **Lead with concepts.** Support pupils in the acquisition of knowledge, through the use of key concepts, terms, and vocabulary, providing opportunities to build a shared and consistent understanding. Glossaries, concept maps and displays, along with regular recall and revision, support this approach.

2. **Structure lessons.** Use supportive frameworks when planning lessons, such as PRIMM (Predict, Run, Investigate, Modify, Make) and Use-Modify-Create. These frameworks are based on research and ensure that differentiation can be built in at various stages of the lesson.

3. **Make concrete.** Bring abstract concepts to life with real-world, contextual examples and a focus on interdependencies with other curriculum subjects. This can be achieved through the use of unplugged activities, proposing analogies, storytelling around concepts, and finding examples of the concepts in pupils' lives.

4. **Unplug, unpack, repack.** Teach new concepts by first unpacking complex terms and ideas, exploring these ideas in unplugged and familiar contexts, then repacking this new understanding into the original concept. This approach, called 'semantic waves', can help pupils develop a secure understanding of complex concepts.

5. **Work together.** Encourage collaboration, specifically using pair programming and peer instruction, and also structured group tasks. Working together stimulates classroom dialogue, articulation of concepts, and development of shared understanding.

6. **Read and explore code first.** When teaching programming, focus first on code 'reading' activities, before code writing. With both block-based and text-based programming, encourage pupils to review and interpret blocks of code. Research has shown that being able to read, trace, and explain code augments pupils' ability to write code.

7. **Create projects.** Use project-based learning activities to provide pupils with the opportunity to apply and consolidate their knowledge and understanding. Design is an important, often overlooked aspect of computing. Pupils can consider how to develop an artefact for a particular user or function, and evaluate it against a set of criteria.

8. **Model everything.** Model processes or practices — everything from debugging code to binary number conversions — using techniques such as worked examples and live coding. Modelling is particularly beneficial to novices, providing scaffolding that can be gradually taken away.

9. **Get hands-on**. Use physical computing and making activities that offer tactile and sensory experiences to enhance learning. Combining electronics and programming with arts and crafts (especially through exploratory projects) provides pupils with a creative, engaging context to explore and apply computing concepts.

10. **Challenge misconceptions.** Use formative questioning to uncover misconceptions and adapt teaching to address them as they occur. Awareness of common misconceptions alongside discussion, concept mapping, peer instruction, or simple quizzes can help identify areas of confusion.

11. **Add variety**. Provide activities with different levels of direction, scaffolding, and support that promote active learning, ranging from highly structured to more exploratory tasks. Adapting your instruction to suit different objectives will help keep all pupils engaged and encourage greater independence.

12. **Foster program comprehension.** Use a variety of activities to consolidate knowledge and understanding of the function and structure of programs, including debugging, tracing, and Parson's Problems. Regular comprehension activities will help secure understanding and build connections with new knowledge.

Computing curriculum map

NB: NCCE resources available here - https://teachcomputing.org/resources

	Autumn	Spring	Summer
YR	Reception will work through all of the key concepts for Computing throughout the year.		
Y1	**NCCE - Systems & networks – Technology around us** Learners become more familiar with the different components of a computer by developing their keyboard and mouse skills, and also start to consider how to use technology responsibly.	**NCCE - Creating media – Digital painting** Learners explore the world of digital art and its exciting range of creative tools. They will create their own paintings, while getting inspiration from a range of other artists. They will consider their preferences when painting with, and without, the use of digital devices.	**NCCE – Programming A – Moving a robot** Learners explore using individual commands, both with other learners and as part of a computer program. They will identify what each floor robot command does and use that knowledge to start predicting the outcome of programs.
Y2	**NCCE - Creating media – Making music** Learners explore how music can make them think and feel. They will make patterns and use those patterns to make music with both percussion instruments and digital tools. They will create different rhythms & tunes, using the movement of animals for inspiration.	**NCCE - Systems & networks – IT around us** With an initial focus on IT in the home, learners explore how IT benefits society in places such as shops, libraries, hospitals. Learners discuss responsible use of technology: how to make smart choices when using it.	**NCCE – Programming A – Robot algorithms** This unit develops pupils' understanding of instructions in sequences and the use of logical reasoning to predict outcomes. Pupils will use given commands in different orders to investigate how the order affects the outcome.
Y3	**NCCE – Programming A – Sequence in music** This unit explores the concept of sequencing in programming through Scratch. It begins with an introduction to the programming environment, which will be new to most learners.	**NCCE - System & networks – Connecting computers** Learners develop their understanding of digital devices, with an initial focus on inputs, processes, and outputs. Learners will compare digital and non-digital devices, before being introduced to computer networks that include infrastructure devices like routers and switches.	**NCCE - Creating media – Desktop publishing** Learners become familiar with the terms 'text' and 'images' and understand that they can be used to communicate messages. They use desktop publishing software and consider font size, colour and type to edit and improve documents.
Y4	**NCCE - Creating media – Audio editing** In this unit, learners will initially examine devices capable of recording digital audio, which will include identifying the input device (microphone) and output devices (speaker or headphones).	**NCCE – Programming A – Repetition in shapes** This unit looks at repetition and loops within programming. Pupils will create programs by planning, modifying, and testing commands to create shapes and patterns.	**NCCE - Systems & networks – The Internet** During this unit learners will apply their knowledge and understanding of networks, to appreciate the internet as a network of networks which need to be kept secure.
Y5	**NCCE - Systems & networks – Sharing information** In this unit, learners will develop their understanding of computer systems and how information is transferred between systems and devices. Learners will consider small-scale systems as well as large-scale systems.	**NCCE - Creating media – Vector drawing** In this unit learners find out that vector images are made up of shapes. They will learn how to use the different drawing tools and how images are created in layers.	**NCCE – Programming B – Selection in quizzes** Pupils develop their knowledge of selection by revisiting how conditions can be used in programs and then learning how the If… Then… Else structure can be used to select different outcomes depending on whether a condition is true or false.
Y6	**NCCE – Programming A – Variables in games** This unit explores the concept of variables in programming through games in Scratch.	**NCCE - Systems & networks – Communication** In this unit, the class will learn about the World Wide Web as a communication tool.	**NCCE - Creating media – Web page creation** Learners identify what makes a good web page and use this information to design and evaluate their own website using Google Sites.

NB: In all NCCE 'Creating media' units, there is an alternative set of lessons for each year group. Teachers may choose the alternative set, if they wish.

What a Computing lesson looks like in our school:

1. Teachers will encourage pupils to remember prior learning and contextualise the learning in situations and language that is familiar to children. Teachers should first unpack complex terms and ideas, exploring these ideas in unplugged and familiar contexts, then repack this new understanding into the original concept.
2. Teachers will use PowerPoint presentations from the Teach Computing websites, alongside other media (videos, music etc) to engage pupils and introduce new concepts.
3. Teachers will utilise 'My Turn, Our Turn, Your Turn' when introducing activities for the day. This is especially useful when teaching programming, where teachers will be the knowledgeable 'master' that children will learn from.
4. Pupils will have opportunities to engage with technology in most Computing lessons. Some lessons are 'unplugged', where no technology is used, but in these lessons key Computing concepts are still to be explored.
5. In lessons where there is technology being used, all pupils will have individual access to technology. Sharing devices is only a last resort, if there are significant technological errors.

Every lesson must include:

1. High quality teacher input, using the Teach Computing PowerPoint, video or other media to engage pupils.
2. Opportunities for pupils to remember their prior learning and contexualise their learning.
3. Formative assessment by teachers – teachers check how children are engaging with the learning and make changes where needed to the level of support or challenge needed.
4. Online Safety – teachers will supervise children while they are using technology, ensuring they are on appropriate resources, monitoring their usage. Every lesson that uses technology must start with a teacher speaking to children about the risks, encouraging children to speak about what they would do if they saw something that upset them while on the devices.
5. Children are given opportunity to use the skills they have learnt in practical contexts – using the technology in appropriate ways or utilising skills in an 'unplugged' activity.

Key concepts

Connect	Code
This concept involves developing an understanding of how to safely connect with others.	This concept involves developing an understanding of instructions, logic and sequences.
Communicate	Collect
This concept involves using apps to communicate one's ideas.	This concept involves developing an understanding of databases and their uses.

NB: 'Connect' – Online Safety is taught throughout the year, in PSHE lessons and whenever Computing equipment is used.

NB: 'Collect' – databases (inputting data, graphing etc.) taught in Maths/Science/Other lessons throughout the year.

Progression (Computing curriculum)

	Communicate This concept involves using apps to communicate one's ideas. NB – See 'Learning graphs' for more detail.	Connect This concept involves developing an understanding of how to safely connect with others. NB – See 'Learning graphs' for more detail.	Code This concept involves developing an understanding of instructions, logic and sequences.	Collect This concept involves developing an understanding of databases and their uses.
Year R	Learners will: experiment with the camera app on an ipad to capture an image/camera devices, experiment with sketching software (Paint.net), experiment with the video feature on an ipad to record something of interest, record sounds in the environment using voice memos.	Learners will name the basic parts of a computer – screen, keyboard and mouse. (See Online Safety map for additional Online Safety information).	Learners will explore by playing with floor robots/digital device and explore what happens when buttons are pushed on an electronic toy or device.	Learners will collect data as a class group.
Year 1	Learners will build their knowledge of parts of a computer and develop the basic skills needed to effectively use a computer keyboard and mouse.	Learners should already be familiar with: . How to switch their device on . Usernames . Passwords	This unit progresses students' knowledge and understanding of giving and following instructions. It moves from giving instructions to each other to giving instructions to a robot by programming it.	Learners will begin to input data into tables within spreadsheets.
Year 2	Learners will build on their knowledge of using technology safely and responsibly, and begin to consider the implications of the choices that they make.	This unit progresses students' knowledge through listening to music and considering how music can affect how we think and feel. Learners will then purposefully create rhythm patterns and music.	Pupils should have had some experience of creating short programs and predicting the outcome of a simple program. This unit progresses students' knowledge and understanding of algorithms and how they are implemented as programs on digital devices.	
Year 3	Learners gain knowledge and understanding of technology by focussing on digital and non-digital devices, and introducing the concept of computers connected together as a network.	This unit progresses learners' knowledge and understanding of using digital devices to combine text and images building on work from Digital Painting (Y1).	This unit assumes that learners will have some prior experience of programming; the KS1 NCCE units cover floor robots.	Learners will input data into tables within spreadsheets and
Year 4	Progresses learners' knowledge and understanding of networks in Year 3. In Year 5, they will continue to develop their knowledge and understanding of computing systems and online collaborative working.	This unit progresses students' knowledge and understanding of creating media, by focusing on the recording and editing of sound to produce a podcast.	This unit progresses students' knowledge and understanding of programming. It progresses from the sequence of commands in a program to using count-controlled loops. Pupils will create algorithms and then implement those algorithms as code.	begin to make different graphs to represent this data.
Year 5	Progresses learners' knowledge and understanding of computing systems and online collaborative working.	This unit progresses students' knowledge and understanding of digital painting and has some links to desktop publishing in which learners	This unit assumes that learners will have prior experience of programming using block-based	Learners will input more complex data into tables

		used digital images. They are now creating the images that they could use in desktop publishing documents.	construction (eg Scratch), understand the concepts of 'sequence' and 'repetition'.	within spreadsheets, making different graphs to suit different types of data and presenting this information in interesting ways.
Year 6	Progresses learners' knowledge and understanding of computing systems and online collaborative working.	Progresses students' knowledge and understanding of the following: digital painting, desktop publishing and vector drawing.	This unit assumes that pupils will have some prior experience of programming in Scratch. Specifically, they should be familiar with the programming constructs of sequence, repetition, and selection.	

Progression of computing equipment/skills (Cross-curricular):

	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Communicate	With guidance, taking photographs and videos to present ideas. Children begin to type up and use software like Google Jamboard to complete activities.	With guidance, creating slideshows to present ideas. Children can use software like Google Docs to complete activities. Children begin to use music-making software, with some guidance.	Independently creating websites, slideshows and other media (podcasts, videos etc) to present ideas. Children can use a range of software to complete activities. Children use music-making software, mostly independently.
Connect	With a lot of guidance, children research ideas using a search engine (websites managed and gathered before the lesson).	With some guidance, children research ideas using a search engine.	Independently research ideas using a search engine, thinking critically about the reliability of the information gathered.
Code	Children use Bee-bots in Maths (rotation and turns) and English (instructional language).	With guidance, children can create a times-tables testing game using Scratch.	Children can make a simple quiz game, using Scratch, to test their peers' knowledge about a topic.
Collect	With a lot of guidance, children can make tables using Google Sheets.	With some guidance, children can input data to make tables and some simple graphs using Google Sheets.	Mostly independently, children can input their own data into tables and make a choice about the type of graph to fit their data, using Google Sheets.

NB: This table is populated with general examples, teachers may choose to develop childrens' Computing skills in the four areas in different ways, in different areas of the curriculum.

Assessment

Formative assessment

Every lesson includes formative assessment opportunities for teachers to use. These opportunities are listed in lesson plans and are included to ensure that misconceptions are recognised and addressed if they occur. They vary from teacher observation or questioning, to marked activities. These assessments are vital to ensure that teachers are adapting their teaching to suit the needs of the pupils that they are working with. The learning objective and success criteria are introduced at the beginning of every lesson. At the end of every lesson, pupils are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down. This gives pupils a reminder of the content that has been covered, as well as a chance to reflect. It is also a chance for teachers to see how confident the class is feeling so that they can make changes to subsequent lessons accordingly.

Summative assessment (KS1)

When we assess, we want to ensure that we are assessing a pupil's understanding of computing concepts and skills, as opposed to their reading and writing skills. Therefore, we encourage observational assessment while pupils are still developing their literacy skills. We believe that this is the most reliable way to capture an accurate picture of learning. To capture summative assessment data of KS1 pupils, teachers will use the success criteria in each lesson and capturing some of the following while the lesson is taking place: The work that pupils complete (marking), notes on conversations or discussions that teachers have or hear during an activity, photographs of the work that pupils produce during an activity, pupils' self-assessments at the end of the lesson.
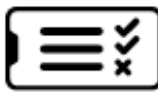
Summative assessment (KS2)

Every unit includes an optional summative assessment framework in the form of either a multiple-choice quiz (MCQ) or a rubric. All units are designed to cover both skills and concepts from across the computing national curriculum. Units that focus more on conceptual development include an MCQ. Units that focus more on skills development end with a project and include a rubric. Each of the MCQ questions has been carefully chosen to represent learning that should have been achieved within the unit. Each MCQ includes an answer sheet that highlights the misconceptions that pupils may have if they have chosen a wrong answer. This ensures that teachers know which areas to return to in later units. Rubrics are a tool to help teachers assess project-based work. Each rubric covers the application of skills that have been directly taught across the unit, and highlights to teachers whether the pupil is approaching (emerging), achieving (expected), or exceeding the expectations for their age group.

KS2 assessment map

	Autumn	Spring	Summer
Year 3	**Programming A – Sequence in music** Rubric	**Computing systems & networks – Connecting computer** Multiple-choice quiz	**Creating media – Desktop publishing** Rubric
Year 4	**Creating media – Audio editing** Rubric	**Programming A – Repetition in shapes** Multiple-choice quiz	**Computing systems & networks – The Internet** Rubric
Year 5	**Computing systems & networks – Sharing information** Multiple-choice quiz	**Creating media – Vector drawing** Rubric	**Programming B – Selection in quizzes** Multiple-choice quiz
Year 6	**Programming A – Variables in games** Rubric	**Computing systems & networks – Communication** Multiple-choice quiz	**Creating media – Web page creation** Rubric

Online safety map

	Autumn **Self-image and identity, Online relationships and (KS2) Privacy and security**			**Spring** **Online reputation, and Online bullying**		**Summer** **Managing online information, Health, well-being and lifestyle and (KS2) Copyright and ownership**		
	Self-image and identity	**Online relationships**	**Privacy and security**	**Online reputation**	**Online bullying**	**Managing online information**	**Health, well-being and lifestyle**	**Copyright and ownership**
YR	I can recognise, online or offline, that anyone can say 'no' to somebody who makes them feel uncomfortable or upset.	I can recognise some ways in which the internet can be used to communicate.	No unit in EYFS/KS1	I can identify ways that I can put information on the internet.	I can describe ways that some people can be unkind online.	I can talk about how to use the internet as a way of finding information online.	I can identify rules that help keep us safe and healthy in and beyond the home when using technology.	No unit in EYFS/KS1
Y1	If something happens that makes me feel sad, worried, uncomfortable or frightened I can give examples of when and how to speak to an adult I can trust and how they can help.	I can explain why it is important to be considerate and kind to people online and to respect their choices.		I can describe what information I should not put online without asking a trusted adult first.	I can describe how to behave online in ways that do not upset others and can give examples.	I can give simple examples of how to find information using digital technologies, e.g. search engines, voice activated searching.	I can explain rules to keep myself safe when using technology both in and beyond the home.	
Y2	I can give examples of issues online that might make someone feel sad, worried, uncomfortable or frightened; I can give examples of how they might get help.	I can give examples of how someone might use technology to communicate with others they don't also know offline and explain why this might be risky.		I can explain how information put online about someone can last for a long time.	I can explain what bullying is, how people may bully others and how bullying can make someone feel.	I can explain why some information I find online may not be real or true.	I can explain simple guidance for using technology in different environments and settings e.g. accessing online technologies in public places and the home environment.	

Y3	I can explain how people can represent themselves in different ways online	I can explain what it means to 'know someone' online and why this might be different from knowing someone offline.	I can describe simple strategies for creating and keeping passwords private.	I can give examples of what anyone may or may not be willing to share about themselves online. I can explain the need to be careful before sharing anything personal.	I can describe appropriate ways to behave towards other people online and why this is important.	I can demonstrate how to use key phrases in search engines to gather accurate information online.	I can explain why spending too much time using technology can sometimes have a negative impact on anyone.	I can explain why copying someone else's work from the internet without permission isn't fair and can explain what problems this might cause.
Y4	I can explain how my online identity can be different to my offline identity.	I can give examples of how to be respectful to others online and describe how to recognise healthy and unhealthy online behaviours.	I can describe strategies for keeping personal information private, depending on context.	I can explain ways that some of the information about anyone online could have been created, copied or shared by others.	I can describe ways people can be bullied through a range of media (e.g. image, video, text, chat).	I can describe some of the methods used to encourage people to buy things online (e.g. advertising offers; in-app purchases, pop-ups) and can recognise some of these when they appear online.	I can identify times or situations when someone may need to limit the amount of time they use technology e.g. I can suggest strategies to help with limiting this time.	I can give some simple examples of content which I must not use without permission from the owner, e.g. videos, music, images.
Y5	I can demonstrate how to make responsible choices about having an online identity, depending on context.	I can explain that there are some people I communicate with online who may want to do me or my friends harm. I can recognise that this is not my / our fault.	I can explain how many free apps or services may read and share private information (e.g. geolocation) with others.	I can describe ways that information about anyone online can be used by others to make judgments about an individual and why these may be incorrect.	I can recognise online bullying can be different to bullying in the physical world and can describe some of those differences.	I can explain what is meant by 'being sceptical'; I can give examples of when and why it is important to be 'sceptical'.	I can explain how and why some apps and games may request or take payment for additional content and explain the importance of seeking permission from a trusted adult before purchasing.	I can give examples of content that is permitted to be reused and know how this content can be found online.

Y6	I can identify and critically evaluate online content relating to gender, race, religion, disability, culture and other groups, and explain why it is important to challenge and reject inappropriate representations online.	I can explain that taking or sharing inappropriate images of someone (e.g. embarrassing images), even if they say it is okay, may have an impact for the sharer and others; and who can help if someone is worried about this.	I can describe simple ways to increase privacy on apps and services that provide privacy settings.	I can explain the ways in which anyone can develop a positive online reputation.	I can describe how to capture bullying content as evidence (e.g screen-grab, URL, profile) to share with others who can help me.	I can define the terms 'influence', 'manipulation' and 'persuasion' and explain how someone might encounter these online (e.g. advertising and 'ad targeting' and targeting for fake news).	I can assess and action different strategies to limit the impact of technology on health (e.g. night-shift mode, regular breaks, correct posture, sleep, diet and exercise).	I can demonstrate how to make references to and acknowledge sources I have used from the internet.

NB: In all units, for all year groups, there are alternative lessons available. Teachers may choose to teach an alternative lesson if they feel it is better suited to their class.