Askwith Primary School

Computing rationale

Our curriculum offer for computing begins in Early Years. 'Children develop quickly in the early years and a child's experiences between birth and age five have a major impact on their future life chances.'

EYFS Statutory Framework, 2021

Our planning, teaching and assessment of the curriculum is informed by the nine principles of cognitive science (Daniel Willingham). This includes the 'must haves' or the end states in the child's mind and the 'could dos' or the teacher behaviours that alter the states in the child's mind. In computing, we recognise the 'must haves' as the alteration to long-term memory that allows children to retrieve substantive and disciplinary knowledge fluently, and to have a positive self-image as a learner. We recognise the 'could dos' as sequenced lessons in computing of the essential knowledge, the explicit teaching of vocabulary and abstract concepts, retrieval practice for knowledge and interleaving.

"A high-quality computing education equips all children (this includes SEND, EAL, PP and vulnerable children), to use computational thinking and creativity to understand and change the world. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming.

Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world." (National Curriculum, 2013)

At Askwith Primary School, we believe that all children's education begins in Early Years. Our curriculum is aligned to the Early Years Framework and shows the sequential steps of essential knowledge acquired from Reception to Year 6.

Intent	**Implementation**	**Impact: to be reviewed at the end of the year**
All knowledge from 2020-2021 is embedded for all year groups	• All knowledge checks for all pupils include connected knowledge from the previous units of learning in order to ensure there are no gaps or forgotten knowledge	

	• All gaps or forgotten knowledge to be addressed prior to teaching new knowledge	
The planning, teaching and assessment of the Computing curriculum is informed by the nine principles of cognitive science (Daniel Willingham).	• Planning and learning journeys consider the essential knowledge and how to guide pupils' thinking • Factual essential knowledge is taught before the skill • Working memory capacity and the alteration of long term memory is considered when planning and teaching (planned thinking time, recalls) • Connected knowledge, particularly knowledge of vocabulary is built on to deepen understanding • Prior knowledge is assessed, misconceptions addressed and new knowledge builds on pupils' connected knowledge • Pupils have opportunities to deliberately practice newly acquired knowledge • Pupils articulate how they know more, remember more and therefore do more • Instil a growth mindset ethos by talking about successes and failures in terms of effort not ability	
The curriculum is balanced and sequenced appropriately so that knowledge across the Computing curriculum continues to be built systematically and embedded in the long-term memory of all pupils	• Clear progression in Computing through progression documents • Staff meetings to ensure that essential knowledge identified in class LTP is being built/retained at appropriate pace	

	• Impact of progression documents/knowledge checks/learning journeys regular item on staff meeting agenda	
All parents/TAs trained in online safety	All staff have greater insight in to pupils' online experiences out of school: • parent questionnaire • UK Safer Internet Centre training • Assembly/family group themes	
Staff have greater insight into pupils' online experiences out of school/pupils will have all had online training	Parents trained/refresher trained in online safety • non attendees targeted • key points included in Parents' Curriculum Evening	

Knowledge in Computing

Knowledge in computing refers to understanding of the three aspects of the computing curriculum:

- Information technology (IT)
- Computer Science (CS)
- Digital Literacy (DL)

Substantive knowledge

Substantive knowledge in computing is understanding how to use technology, how to be safe and knowing how to program. This is developed through providing appropriate scaffolding, deliberate practice and by children applying their knowledge of how to be computational thinkers so that they know more, remember more and do more. Daily lesson planning must take into account children's working memory capacity so that only one to four pieces of information need to be remembered.

"Computational thinking is an important life skill, which all pupils now need to develop. It is central to both living in and understanding our digitally enriched world. It is a cognitive process involving logical reasoning by which problems are solved across the whole curriculum and through life in general." (Computing at School, 2015)

In order to develop as computational thinkers, children engage with computational concepts and approaches:

Concepts	Approaches
• Logic: predicting and analysing • Algorithms: making steps and rules • Decomposition: breaking down into parts • Patterns: spotting and using similarities • Abstraction: removing unnecessary detail • Evaluation: making judgements	• Tinkering: experimenting and playing • Creating: designing and making • Debugging: fixing and finding errors • Persevering: keeping going • Collaborating: working together

Disciplinary knowledge

Disciplinary knowledge in computing is the use and interpretation of substantive knowledge in order to develop original digital content and programs.

Why this, why now?

EYFS

Nursery children explore how things work including peg boards, K'nex and beebots. Reception learn about instructions, directional language (left, right, forwards and backwards), how to give instructions to others and how to program a beebot. Online safety is covered in the Autumn term, ensuring children know how to be safe online and how to report any concerns. Children also learn how to use a computer/tablet touchscreen.

Key stage 1 and Key stage 2

The rolling programme of units of knowledge allows for mixed year classes to acquire essential knowledge over two years for KS1 and KS2 (year A&B).

Key stage 1

Year A

Online safety and exploring purple mash/laptop use is taught first in KS1 in Year A for all of KS1. This is then repeated in year B for the new Year 1 cohort and serves as a refresher for the Year 2 children. In addition, in year B, Year 2 learn about searching and sharing in purple mash.

For all of KS1 and KS2, coding is the primary focus in the spring and summer terms of year A. KS1 learn about algorithms, creating, debugging and predicting the behaviour of simple programs. KS2 learn to design, write and debug programs and consider logical reasoning linked to algorithms. They also explore sequence, selection, variables, simulation, decomposition and abstraction.

Year B

In Year B, KS1 focus on digital literacy and their knowledge of how to use information technology. During the spring term of Year B, Children explore safe and correct use of technology and search engines. During the summer term, they build on this by improving their knowledge and practical use of information technology in order to create an animated story.

Key stage 2

Year A - Autumn

Building on their connected knowledge of effective searching in KS1, Year 3/4 children learn more effective strategies for online searching using the internet and learn about source credibility and how search results are selected and ranked.

Having developed the knowledge of effective searching in KS1 and then deepening this understanding in Year 3/4, children explore networks in more depth in Year 5/6. They learn the terminology of computer networks, including the internet and the World Wide Web.

Year A - Spring and Summer Terms (Coding)

- as detailed above

Year B - Autumn

This term focuses on how to use technology safely and responsibly. Year 3/4 focus on methods and procedures required to create effective emails. This is then built upon in Year 5/6 where children learn how to contribute to, comment on and assess the effectiveness of blogs.

Year B – Spring

In this term, Y3/4 learn how to create presentations, building on their connected knowledge from the animating stories unit in KS1.

In Year 5/6 children deepen their understanding of the ways in which information technology can be used by focussing on 3D model design. Children learn how to use computer software to design, print and make a 3D model for a specific purpose.

Year B - Summer

The using logo (Y3/4) and game creating (Y5/6) units allow children to further explore computer science by designing, writing and debugging programs that accomplish specific goals through using a different software. Y3/4 children learn about text based coding. Y5/6 children review and analyse complete games and then collaborate to make their own using a 3D game designing software.

For all years, digital literacy is taught throughout all units as appropriate. Each time children use technology, they are reminded about staying safe online and how to report concerns. Other aspects are taught in combination with the PSHE curriculum.

Challenging the More Able

Children who are working at the expected standard with greater depth are given opportunities to deepen their understanding of the substantive knowledge and apply this knowledge to build their disciplinary knowledge. The assessment guidance for each unit of work offers suggestions on how to challenge children. For example, when learning about Networks, more able children may find out more about the difference between the Internet and the World Wide Web and would be able to provide examples, thus deepening this substantive knowledge. When coding, they may create more complex programs that utilise all the coding constructs that they have learnt about and extend their own learning by trying out different ways to code that achieve a specific purpose. How the more able children are challenged will depend on the outcomes of knowledge check 1 and based on ongoing formative assessment of children's learning within a unit.

Creativity

Creativity and knowledge should work together as creativity involves making connections and using 'old' knowledge to create 'new'. Computing is an area of the curriculum that has many opportunities for children to demonstrate creativity through developing their own programs, systems and digital content whilst applying their developing computational thinking. Computing has opportunities for natural cross-curricular learning; examples include presenting data and information, researching in History or writing instructions in English.

Assessment

Tracking children's progress throughout their school life is vital in order to establish their acquisition of knowledge. At Askwith Primary School, pupils complete a knowledge check to demonstrate their connected knowledge, and new essential knowledge. Teachers plan and teach lessons based on the outcomes of 'knowledge check (1)', which often include the revisiting and securing of connected knowledge before tackling the new essential knowledge. Assessment for learning strategies are implemented throughout the teaching of the unit of knowledge. This includes the use of 'mini knowledge checks' which includes low stakes quizzes.

Any misconceptions that arise throughout the unit are identified and addressed appropriately. End of unit knowledge check takes place approximately two weeks after the end of the unit of knowledge (knowledge check 2). Two further knowledge checks take place approximately six weeks and then twelve weeks later in order to embed knowledge in long-term memory (knowledge checks 3 and 4).

An integral part of computing is fostering the children's ability to develop digital content in a creative way. Programs are created on digital devices and as such are not recorded in the same way as written learning. Learning may be recorded in many ways including but not limited to: a written summary of learning, printed screenshots of creations, saved programs, power points, word documents, written work, photographs and video recordings. As such, children's work is marked and written feedback given only where appropriate. Otherwise, feedback is given verbally to children in order to support them to progress within and across lessons. The 'process' undertaken to arrive at the finished product, algorithm or program is as important as the finished product and this will be taken into account.

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