COMPUTING POLICY

DATE PALM STATEMENT of INTENT

At Date Palm our vision is for the School to ensure our pupils grow like a Date Palm tree – with **strong foundations, lofty branches and produce fresh fruit**:

- ✓ To build **Strong Foundations for Character Development** that:
  Instil values; inspire each pupil; display best manners.
- ✓ To have **Lofty Branches of Educational Excellence** that will:
  Provide a broad and varied range of experiences and learning opportunities; help each pupil progress and develop in all aspects; support their skills and talents.
- ✓ To produce **Fresh Fruit that provides services to their Communities** in order to:
  Become responsible and confident citizens; make a positive difference; commit to charitable endeavours; become effective contributors towards Britain's future.

Reviewed by	Position	Signature
Saira Karim	Computing Coordinator	
Kiran Rahman	External Governor	

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The Teaching and Learning of Computing Policy

Introduction

The 2014 National Curriculum introduces a new subject, Computing, which replaces ICT. This represents continuity and change, challenge and opportunity. It gives schools the chance to review and enhance current approaches in order to provide an even more exciting and rigorous curriculum that addresses the challenges and opportunities offered by the technologically rich world in which we live.

- Computing is concerned with how computers and computer systems work, and how they are designed and programmed.
- Pupils studying computing will gain an understanding of computational systems of all kinds, whether or not they include computers.
- Computational thinking provides insights into many areas of the curriculum, and influences work at the cutting edge of a wide range of disciplines.

Intent

"The walls of the classroom and the home have been expanded by social media, the cloud, wikis, podcasts, video-conferencing etc…We can't underestimate how rapidly things are changing and we need to make sure no opportunity passes us by to improve learning outcomes." [Digital Education Advisory Group, Australia, 2013]

Our Curriculum has been designed to ensure each and every child can 'live life in all its fullness'. With this purpose in mind, our computing curriculum plays an integral part in our pupils' education, both as a standalone subject and also incorporated into other areas to enhance learning throughout the curriculum. It is inevitable that children arrive in school with already-gained experience of technology; our curriculum welcomes pupils' expertise into the classroom and allows them to develop it further ensuring they leave Date Palm with a set of robust skills, confidence and capability to use computing throughout their later life safely and responsibly.

Research Links

Our computing curriculum is based mainly on the Constructivist theory developed by Dewey (1938). This theory emphasises the fact that knowledge is active, subjective and constructive and that pupils are at the centre of the learning process (Ben-Ari, 1998). Learning in the computing lesson is experience-based. *[It rejects] the traditional domination-subordination relationship between teacher*

and taught, makes knowledge reflexive rather than disciplinary, the child an active agent in his or her own learning, and the classroom a workshop or laboratory [Alexander, 2008].

The Computer Science element of our curriculum is implemented using current research and methods. Other areas of Computing also benefit from some of these strategies.

- **Concept before Code:** Developing key concepts before coding reduces cognitive load and develops an understanding separate from code, making an idea more portable between algorithm and different programming languages, (Shuchi Grover, 2019)
- **Use-Modify-Create:** A three stage progression framework used by KS1 which scaffolds increasingly deep interactions with a programming language, (Lee et al., 2011). Learners may transition back and forth from users to modifiers to creators.

Figure 5: Use-Modify-Create Learning Progression
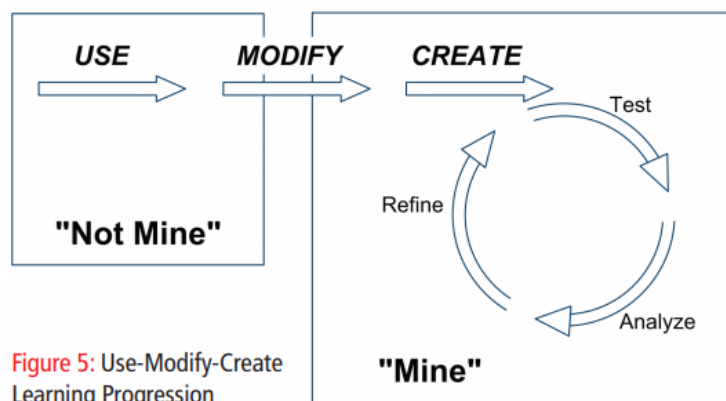
- **PRIMM:** A structured approach to teach programming which incorporates scaffolded learning and a promotion of discussion about what is going on in the programs, (Sue Sentance, 2017). Learners also articulate problems around codes and try to overcome them.
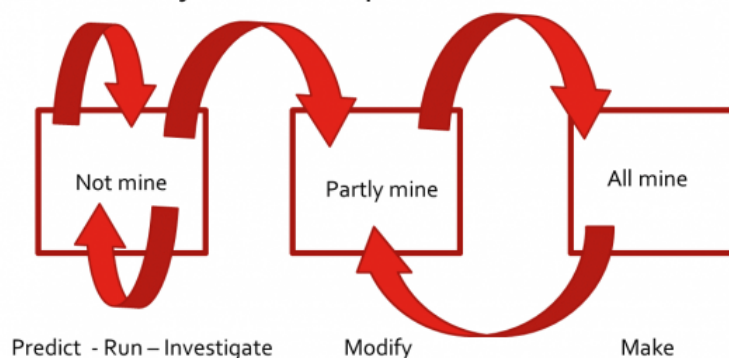
- **Debugging Strategies:**
  - **Reading out loud:**
    - Pupils read code aloud to see if it does what they wanted it to do.
    - Pupils read code to a partner to see if it sounds right.
    - Pupils read code to see if it the same as teacher or peer.
    - Pupils read code written in abbreviations in full.

- o **Comparison:**
  - Looking for simple colour differences if using blocks.
  - Looking for different shapes.
  - Looking for things that are missing.
  - Looking for too many things.
  - Looking for missing gaps (FD 40 FD40).
  - Looking for patterns that are different.
- o **Divide and Conquer:**
  - Breaking up longer sequences of code and running parts of it separately to try and find out where the error is.

Implementation

At Date Palm Primary School we use Twinkle's computing scheme of work, code-it programming units, and some bespoke units, alongside recommended software and apps to teach our computing curriculum. Computing is taught both as a discrete subject, and cross-curricular when the opportunity presents itself. The iPads/tablets are distributed around the school and will be used to help pupils access the computing curriculum, along with our ICT room containing PCs. All computers are networked and linked to the internet. The school has an 'Acceptable use of the Internet' Policy, which Parents/Guardians are asked to agree to, before their child uses the Internet.

In addition, the computing Leader sets classroom expectations so that staff and children are kept up to date with how and in what way computing learning should happen. Work samples, observations and children's voices are all monitored and tracked to ensure these expectations are met.

There are three aspects of the computing curriculum:

- **computer science** (CS),
- **information technology** (IT)
- **digital literacy** (DL)

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. 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.

The National Curriculum outlines Computing Teaching as follows:

	EYFS	Key Stage1	Key Stage 2
Computer Science	ELG 02 Understanding: children follow instructions involving several ideas or actions. They answer 'how' and 'why' questions about their experiences and in response to stories or events. ELG 04 Moving and handling: children show good control and co-ordination in large and small movements. They move confidently in a range of ways, safely negotiating space.	Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions Create and debug simple programs Use logical reasoning to predict the behaviour of simple programs	Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts Use sequence, selection, and repetition in programs; work with variables and various forms of input and output Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web Appreciate how [search] results are selected and ranked
Information Technology	ELG 13 People and communities: children talk about past and present events in their own lives and in the lives of family members. They know that other children don't always enjoy the same things, and are sensitive to this. They know about similarities and differences between themselves and others, and among families, communities and traditions. ELG 15 Technology: children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.	Use technology purposefully to create, organise, store, manipulate and retrieve digital content	Use search technologies effectively Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
Digital Literacy	ELG 16 Exploring and using media and materials: children sing songs, make music and dance, and experiment with ways of changing them. They safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. ELG 17 Being imaginative: children use what they have learnt about media and materials in original ways, thinking about uses and purposes. They represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role-play and stories. ELG 06 Self-confidence and self-awareness: children are confident to try new activities, and say why they like some activities more than others. They are confident to speak in a familiar group, will talk about their ideas, and will choose the resources they need for their chosen activities. They say when they do or don't need help. ELG 07 Managing feelings and behaviour: children talk about how they and others show feelings, talk about their own and	Recognise common uses of information technology beyond school Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies	Understand the opportunities [networks] offer for communication and collaboration Be discerning in evaluating digital content Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

	others' behaviour, and its consequences, and know that some behaviour is unacceptable. They work as part of a group or class, and understand and follow the rules. They adjust their behaviour to different situations, and take changes of routine in their stride.		

Computational Thinking

Computational thinking is at the heart of the computing curriculum. This development of thinking is also used in other areas of the curriculum. Teachers facilitate and develop children to think computationally during computing lessons by helping them to think carefully about a problem, break it down into smaller parts, focusing on the important things and ignoring unnecessary details, to help solve a problem. Computational thinking consists of:
- Abstractions
- Decomposition
- Generalisation
- Algorithms
- Evaluation

Abstraction

This is the process of reducing the complexity of information and focusing on the essential concepts to understand and solve problems. QuickStart Computing (2015) suggests that this means 'identifying what is important without worrying too much about the detail.' It is thought process which can be used in many areas of the curriculum such as solving word problems in maths.

Decomposition

Once the essential information has been identified, it is important to look at how the problem can be solved. This is where decomposition comes in where complex ideas are broken down into small bits so that they are easier to work with.

Algorithms

After breaking the problem down into smaller chunks, each component is solved separately. Algorithms are created, which are step-by-step instructions in sequence to solve the problem. Once an algorithm has been designed, it is put to the test, evaluated and improved - this is known as 'debugging', where bugs are identified and solutions found.

Teacher's Role

Teachers use the planning units from the long term plan and adjust the planning as required to meet the needs of their class. At times, teachers plan their own units of work or standalone lessons to complement the Twinkle/code-it scheme.

Teachers review previous skills and model new skills to the children at the beginning of each lesson. Children are provided with sufficient time to practise their skills usually within a context. During programming lessons, teachers introduce the concepts before delving into the code. They use an appropriate scaffolding framework to move the children from using someone else's code to owning the code themselves. Teachers also develop the children's resilience by allowing them to debug using taught debugging strategies, providing them with prompts rather than fixing the problem for them.

Early Years

In the Foundation Stage, good learning is seen as active and independent (Mertala 2017), however this is not always the case with technology. Research suggests that technology is more likely to have a positive effect when children use it alongside adults or more experienced peers (McCarrick and Li 2007). If children use technology on their own, they may not use it in the most efficient way (Preradovic, Lesin & Boras, 2017)
Adults need to scaffold and model appropriate use (Neumann & Neumann, 2014).

It is important in the Foundation Stage to give children a broad, play-based experience of Computing in a range of contexts. Computing is not just about computers. Early years learning environments should feature Computing scenarios based on experience in the real world, such as in role play. Children gain confidence, control and language skills through opportunities to explore using computers/tablets and also non-computer based resources such as microwaves. Recording devices can support children to develop their communication skills. This is particular useful with children who have English as an additional language.

SEND: Inclusive Computing

Date Palm Primary School has a duty to deliver the Computing curriculum to all pupils, including those with special educational needs and disabilities. A priority for young people with SEND is to be able to influence and access the world around them, and technology is often a key part of this. We recognise that each pupil with SEND can have very different learning needs from another, and not all pedagogical approaches or resources will be suitable for all learners. Therefore, the Computing curriculum is adapted to meet each pupil's needs. We use the following strategies when teaching programming and computational thinking:

- Unplugged activities: tasks that take place away from a computer to model key concepts in different ways, often with a physical element.
- Relevant, personalised tasks: teaching abstract concepts through a familiar context in order to reduce the amount of new knowledge that is required for a learner to process. Furthermore, using contexts that relate to pupils' interests can be a major driver to their learning.
- Small chunks of activity: short bursts of activity in order to maintain interest and the reduction of complexity by decomposing problems into smaller parts.
- Physical computing: using floor bots and other physical devices as 'objects-to-think-with'.
- Tinker time: allows pupils to tinker with new software/hardware before actually working with them. Tinkering or trying things out can be play based, exploration when learning about something. It also provides a basis for making and exploring, often through trial and improvement. This can remove any fear or anxiety related to trying out new

software/hardware.

- Pair programming: learners work in pairs to write a program. One person acts as 'driver', with control of the mouse and keyboard, and writes the code. The other person is the 'navigator', providing advice and checking for errors. During the lesson, they will swap roles at intervals directed by the teacher. He and Chen (2014) demonstrate that this produces higher levels of confidence, greater enjoyment and increased independence.

The Computer Science element of our curriculum is implemented using current research and methods as   mentioned previously. We use the Use-Modify-Create and PRIMM approaches which start off with highly scaffolded activities where pupils simply run a code and observe what happens. This provides an opportunity for pupils to engage with code without having to create their own program, thus reducing cognitive load. Through these approaches, learners with poor working memory or difficulties with written language can still investigate how a program works, discuss what different parts of the code do, and create their own version by adapting pre-existing code. Some of these strategies are also used in the other elements of the Computing curriculum.

SEND: Technology across the curriculum

At Date Palm Primary School, we recognise the effectiveness of technology as a tool for teaching and learning across the curriculum. Assistive technology provides useful support for children and young people who have literacy difficulties, helping them to develop independence and supporting their inclusion in classes with their peers. We use the following assistive technologies for our pupils with special educational needs and disabilities:

- Text to speech (TTS): helps those with reading difficulties access text. Reading can be less tiring and stressful when using TTS, which can double or triple the time that students could sustain reading (Elkind, 1998).
- Speech to text: this allows talk to be typed. It is beneficial for those pupils who struggle with writing and spelling.
- Concept Mapping – this can help sequencing and planning for those pupils who struggle with organising and getting their thoughts into a coherent, linear style of writing.

Impact

After the implementation of our computing curriculum, pupils of Date Palm will have developed their knowledge and skills relative to their starting points. They will be equipped with digital literacy, confidence and resilience which will aid them in continuing their technological journey in the next phase of their education. Some of our pupils will be inspired to pursue a career in computing.

In order to assess the impact of the computing curriculum we assess pupils' attainment against the National Curriculum at the end of each term. Records are kept in the form of saved work on the PCs, hard copies of worksheets and recorded data on an assessment tracker. Achievement is reported to parents at the end of each academic year as part of the annual report to parents.

Leadership

The overall responsibility for the use of Computing rests with the senior management of a school. The Head, in consultation with the Computing subject leader and SLT:

- Determines the ways computing should support, enrich and extend the curriculum;

- Determines the provision and allocation of resources;

- Embrace new initiatives and support the implementation of whole school approaches e.g. sharing safer internet messages with parents, sharing of the computing policy, supporting the celebration of Internet E-Safety Day each year

- Ensure the use and development of the Twinkle scheme of work/ bespoke planning is used consistently for the computing curriculum. This will develop the pre-requisites for the use of computing across the curriculum e.g. track Computing attainment and progress each term.

- Manage the provision and deployment of resources.

- Encourage and support colleagues within their use of computing.

  board on the spending and impact of any computing funding.

- Provide relevant technical support for teachers in terms of basic troubleshooting.

- Co-ordinate the evaluation and review of the school's computing policy.

- Ensure school displays are maintained with up to date information intended to support children's understanding and experience of Computing.

Health and Safety

To avoid continuous focus on the screen, teachers should model taking breaks at regular intervals.

All pupils must have returned a signed consent form for them to use the internet. (These are completed during the admission process.)

Although internet access within school is protected by the school's security system, the risks of Internet use are still present. We believe it is vital to teach Online-safety as part of the Computing curriculum. This is embedded throughout the key stages.