Computing Knowledge Ladders for Hagley Primary School

Nursery

Key Concepts:

In Nursery, there are no early learning goals that directly relate to computing objectives, though it is still expected that children will be introduced to appropriate technology and use it within their provision. Alongside this, our provision is centred around play-based, unplugged (no computer) activities that focus on building children's listening skills, ordering and sequencing, curiosity, creativity and problem solving. Mechanical equipment with simple mechanisms will provided for children to play with and investigate. In the Early Years the focus is on computational thinking and the unplugged approach through the concepts: Logic, Evaluation, Algorithms and Decompositions, Patterns and Extraction and approaches: Tinkering, Creating, De-bugging, Persevering and Collaborating.

Information Technology - Computing Systems

Recognising what technology is and what technology we have at home and in school.

Hands on exploration of old equipment such as typewriters, keyboards or other mechanical toys and how they work.

Children explore electronic devices and their software to discover how they work and what they can be used for, e.g. CD players, IWB.

Key Vocabulary:
Keyboard, Tablet, Phone, Computer, CD player, Typewriter

Computer Science - Programming

Understand a 2 part instruction.

Begin to describe a sequence of events.

Ordering and sequencing a range of things including stories.

Key Vocabulary:
First, Next, Then

Digital Literacy – Creating Media

Taking a photograph with a camera or tablet.

Making a video of themselves or their friends in their play.

Drawing pictures on the IWB.

Key Vocabulary:
Photo, Camera, Video, Interactive Whiteboard

Information Technology - Data and Information

Searching for something on the internet, guided by an adult.

Sorting and labelling.

Finding their name.

Key Vocabulary:
Internet, Sort, Label

Reception

Key Concepts:
In Reception, there are no early learning goals that directly relate to computing objectives, though it is still expected that children will be introduced to appropriate technology and use it within their provision. Alongside this, we follow the Barefoot Computing curriculum, based around cross-curricular computational thinking concepts to help develop problem solving skills. In the Early Years the focus is on computational thinking and the 'unplugged approach' through the concepts: Logic, Evaluation, Algorithms and Decompositions, Patterns and Extraction and approaches: Tinkering, Creating, De-bugging, Persevering and Collaborating.

Busy Bodies

To learn about the human body from a range of sources. (logic, pattern, abstraction)

To understand how to create a model of the human body. (abstraction, decomposition, algorithms)

To know the different stages of growth (patterns, algorithms)

To be able to follow a simple set of instructions. (algorithms, decomposition, debugging)

Key Vocabulary:
Movement, growth, pattern, first, next, then

Awesome Autumn

To develop the skill of using language of position and direction to map out a route.
(logic, algorithms, decomposition, creating)

To use my knowledge of repeating patterns to create a garland. (creating, pattern, logic)

To understand how to follow a sequence in order to make pumpkin soup.
(algorithms, decomposition, collaboration)

Key Vocabulary:
Movement, forwards, backwards, turn, left, right

Winter Warmer

To be able to follow a set of instructions to make a bird feeder. (algorithms, decomposition, creating, collaborating)

To explore different materials and resources to create a structure. (logic, tinkering, decomposition, collaborating, persevering)

To understand how to follow a pattern in order to create a scarf. (creating, pattern, logic)

Key Vocabulary:
First, next, then, pattern

Boats Ahoy

To know how to use technology in order to find information. (logic, pattern, abstraction)

To develop my knowledge of floating and sinking. (tinkering, logic, pattern)

To develop the skill of working as a group to make a loose parts boat. (decomposition, creating, abstraction, collaborating)

To develop the skill of creating using materials in order to make a boat. (algorithms, decomposition, creating)

Key Vocabulary:
Predict, reason

Spring Time

To develop the skill of working as a team in order to make a junk scarecrow. (abstraction, tinkering, creating, collaborating)

To use my knowledge to create and test a set of instructions. (algorithms, persevering, collaborating)

To be able to follow a sequence in order to plant some seeds. (algorithms decomposition collaborating)

Key Vocabulary:
Plan, create, test, sequence, order, first, next, then

Super Space

To develop the skill of breaking down an idea into steps in order to create an alien (creating, logical reasoning)

To develop the skill of using different materials in order to create a rocket. (tinkering, abstraction, creating)

To understand how to create a set of instructions to direct a rocket around a grid. (algorithms, collaborating, persevering

Key Vocabulary:
Plan, create, test, sequence, order, first, next, then, material

Year 1

Systems - Technology around us

To explain that technology is something that can help us
To identify examples of technology and explain how they help us.
To recognise that a computer is an example of technology.
To begin to recognise that choices are made when using technology and explain why rules are needed when using it.

Programming - Moving a robot

To explain what a given command does
To match a command to an outcome
To understand that a program is a set of commands that a computer can run
To recall that a series of instructions can be issued before they are enacted

Media - Digital Painting

To explain what different freehand tools do
To recognise computers can be used to create art
To recognise a tool can be adjusted to suit my needs
To decide when it's appropriate to use a tools
To consider impact of choices made
To compare painting using a computer with painting with brushes.

Programming - Animations

To predict the outcome of a command on a device
To recall words that can be enacted
To enact a given word
To list that commands can be used on a given device
To explain what a given command does
To match a command to an outcome
To recognise how to run a command (press a button)
To choose a command for a given purpose
To understand that a program is a set of commands a computer can run
To recall that a series of instructions can be issued before they are enacted
(Not taught due to time constraints)

Media - Digital Writing

To recognise that a keyboard is used to enter text into a computer
To recognise that the shift key changes the output of a key
To recognise that text can be changed
To recognise that text can be edited
To recognise that the appearance of text can be changed.

Data Handling - Grouping Data

To identify that objects can be counted
To recognise that information can be presented
To recognise that information can be presented in different ways
(Taught through Maths and Science)

Key vocabulary: See Teach Computing Vocabulary List

Year 2

Systems - IT around us

To recognise the different types of technology used in our school.
To identify that a computer is a part of information technology.
To recognise the features of information technology.
To talk about uses of information technology and say how rules for using information technology can help us
To explain how information technology benefits us
To recognise that choices are made when using information technology

Programming - Robot Algorithms

To describe that a series of instructions is a sequence
To explain what happens when we change the order of instructions
To recognise that you can predict the outcome of a program
To recall that a series of instructions can be issued before they are enacted

Media - Digital Photography

To recognise that some digital devices can capture images using a camera.
To talk about how to take a photograph
To recognise that photographs can be saved and viewed later
To make choices when composing my photograph
To recognise features of 'good' photographs
To identify how a photograph could be improved.
To explain the effect of light on a photo.

Programming - Quizzes

To describe a series of instructions as a 'sequence
To recall that a series of instructions can be issued before they are enacted
To use logical reasoning to predict the outcome of a program
(Not taught due to time constraints)

Media - Digital Music

To identify that computers can be used to play sounds of different instruments
To identify that the same pattern can be represented in different ways.
To compare playing music on instruments with making music on a computer

Data Handling - Pictograms

To use a tally chart to collect data
To compare objects that have been grouped by attribute
To suggest appropriate headings for tally charts and pictograms
To construct (complete) a given comparison question
To use a computer program to present information in different ways
To explain that we can present information using a computer
To give simple examples of why some information should not be shared
(Taught through Maths)

Key vocabulary: See Teach Computing Vocabulary List

Year 3

Systems - Connecting Computers

To describe what an input is
To explain that a process acts on the inputs
To explain that an output is produced by the process
To identify how changing the process can affect the output
To recognise that a digital device is made up of several parts.
To recognise that computers can be connected to each other.
To identify how devices in a network are connected to one another.
To recognise that a network is made up of a number of components
To explain how information is passed through multiple connections.
To identify the benefits of computer networks.

Programming - Sequencing Sounds

To identify input and output devices
To explain that a computer system accepts an input and processes it to produce an output.
To explain how a computer network can be used to share information.
To explain the role of a switch, server and wireless access point in a network.
To identify network devices around me.
To explain how networks can be connected to other networks

Media - Stop Motion Animation

To explain that an animation is made up of a sequence of images.
To identify that a capturing device needs to be in a fixed position.
To recognise that smaller movements create a smoother animation.
To explain the need for consistency in working
To explain the impact of adding other media to an animation
To explain that a project must be exported so it can be shared.
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Programming - Events and Actions in Programs

To explain that programs start because of an input
To explain what a sequence is
To identify that a program includes sequences of commands
To identify that the sequence of a program is a process
To explain that the order of commands can affect a program's output
To identify that different sequences can achieve the same output
To identify that different sequences can achieve different outputs

Media – Audio Production

To identify that sound can be recorded
To identify that an input device is needed to record sound. To identify that output devices are needed to play audio.
To recognise that recorded audio can be stored on a computer. To recognise that audio can be edited
To recognise that sound can be represented visually as a waveform
To recognise that desktop publishing pages can be structures with placeholders
To recognise how different font styles and effects are used for particular purposes.
To consider the benefits of use an app for word publishing.

Data Handling - Branching Databases

To investigate questions with yes/no answers
To identify attributes that you can ask yes/no questions about
To select an attribute to separate objects into two similarly sized groups
To explain that a branching database is an identification tool
To recognise that a data set can be structured using yes/no questions
To explain that a well-structured branching database will enable you to identify objects using fewer questions
To relate two levels of a branching database using

Key vocabulary: See Teach Computing Vocabulary List

Year 4

Systems – The Internet

To outline how information can be shared via the web.
To recognise that the web is part of the internet.
To recognise the need to security on the internet.
To evaluate the reliability of content and the consequences of unreliable content

Programming – Repetition in Shapes & Repetition in Games

To relate what 'repeat' means
To identify everyday tasks that include repetition as part of a sequence, eg brushing teeth, dance moves
To explain that we can use a loop command in a program to repeat instructions
To identify patterns in a sequence
To identify a loop within a program
To explain that in programming there are indefinite loops and count-controlled loops
To explain that an indefinite loop will run until the program is stopped
To explain that you can program a loop to stop after a specific number of times
To identify patterns in a sequence, eg 'step 3 times' means the same as 'step, step, step'
To justify when to use a loop and when not to
To explain the importance of instruction order in a loop
To recognise that not all tools enable more than one process to be run at once

Media - Publishing

To recognise that audio can be layered so that multiple sounds can be played at the same time.
To consider the results of editing choices made.
To recognise how text and images can be used together to convey information
To define landscape and portrait as two different page orientations
To consider how different layouts can suit different purposes.

Media – Photo Editing

To use an application to change the whole of a digital image
To use an app to change part of a digital image
To use an app to add to the composition of a digital image
To recognise that digital images can be manipulated
To recognised that digital images can be changed for different purposes
To choose the most appropriate tool for a particular purpose
To consider the impact of changes made on the quality of the image

Data Handling – Data Logging

To suggest questions that can be answered using a table of data
To identify data that can be logged over time
To identify that sensors are input devices
To recognise that a sensor can be used as an input device for data collection
To explain that a data logger captures 'data points' from sensors over time

Key vocabulary: See Teach Computing Vocabulary List

Year 5

Systems – Systems and Searching

To recognise that a system is a set of interconnected parts which work together
To explain that computers can be connected together to form IT systems
To identify that data can be transferred between IT systems
To recognise inputs, processes, and outputs in large IT systems
To describe the role of a particular IT system in their lives
To relate that search engines are examples of large IT systems
To explain why search engines create indices, and that they are different for each search engine
To explain the role of web crawlers in creating an index
To explain how search results are selected
To explain that ranking orders search results to make them more useful

Key vocabulary: See Teach Computing Vocabulary List

Programming - Selection in Physical Computing & Selection in Quizzes

To explain that a condition can only be true or false
To relate that a count-controlled loop contains a condition
To compare a count-controlled loop with a condition-controlled loop
To explain that a condition-controlled loop will stop when a condition is met
To explain that when a condition is met, a loop will complete a cycle before it stops
To explain that selection can be used to branch the flow of a program
To explain that a loop can be used to repeatedly check whether a condition has been met
To explain the importance of instruction order in 'if...then...else...' statements

Media – Vector drawing

To identify that a vector drawing comprises separate objects
To recognise that each object in a drawing is in its own layer
To recognise that vector images can be scaled without impact on quality
To recognise that objects can be modified in groups
To explain how alignment and size guides can help create a more consistent drawing
To consider the impact of choices made.

Media – Video Production

To explain the features of video as well as visual media format.
To recognise which devices can and can't record video
To explain the purpose of a storyboard.
To recognise that filming techniques can be used to create different effects.
To recognise the need to regularly review and reflect on a video project
To explain the limitations of editing a video on a recording device.
To identify that videos can be edited on a recording device or on separate software.
To identify videos can be improved through reshooting and editing.
To recognise projects need to be exported to be shared.

Data Handling – Flat-file databases

To explain that a computer program can be used to organise data
To explain that tools can be used to select data to answer questions
To outline how ordering data allows us to answer some questions
To outline how operands can be used to filter data
To outline how 'AND' and 'OR' can be used to refine data selection
To explain that computer programs can be used to compare data visually
To explain that we present information to communicate a message

Year 6

Systems – Communication and collaboration

To recognise that data is transferred across networks using agreed protocols (methods)
To recognise that connections between computers allow access to shared stored files
To explain that data is transferred in packets
To recognise computers connected to the internet allow people in different places to work together
To discuss the opportunities that technology offers for communication and collaboration

Media – 3D Modelling

To explain that 3D models can be created on a computer
To recognise that a 3D environment can be views from different perspectives
To recognise that digital tools can be used to manipulate 3D objects
To show how placeholders can create holes in 3D objects
To recognise that artefacts can be broken down into a collection of 3D objects

Programming – Variables in Games & Sensing Movement

To define a 'variable' as something that is changeable
To identify examples of information that is variable, for example, a football score during a match
To explain that a variable can be used in a program, eg 'score'
To define a program variable as a placeholder in memory for a single value
To explain that a variable has a name and a value
To recognise that the value of a variable can be used by a program
To recognise that the value of a variable can be updated
To identify that variables can hold numbers (integers) or letters (strings)
To define the way that a variable is changed
To recognise that a variable can be set as a constant (fixed value)
To explain the importance of setting up a variable at the start of a program (initialisation)
To explain that there is only one value for a variable at any one time
To explain that the name of a variable is meaningless to the computer
To explain that if you read a variable, the value remains
To explain that if you change the value of a variable, you cannot access the previous value (cannot undo)
To explain that the name of a variable needs to be unique

Media – Web Page Creation

To recognise the relationship between HTML and visual display
To recognise that web pages can contain different media types
To recognise that web pages are written by people
To recognise that a website is a set of hyperlinked web pages.
To recognise components of a web page layout.
To consider the ownership and use of images (copyright).
To recognise the need to preview pages (different screens/devices)
To recognise the need for a navigation path.
To recognise the implications of linking to content owned by others.

Data Handling – Introduction to Spreadsheets

To identify questions that can be answered using spreadsheet data
To explain what an item of data is in a spreadsheet
To explain how the data type determines how a spreadsheet can process the data
To outline that there are different software tools to work with data
To explain that formulas can be used to produce calculated data
To recognise cells can be linked
To recognise that a cell's value automatically updates when the value in a linked cell is changed
To evaluate results in comparison to the question asked

Key vocabulary: See Teach Computing Vocabulary List