Mendell Primary School

Aspire   Challenge   Achieve

Medium Term Plan Design Computing

Year Group: 3	Term: Sum #2 2022	Teacher: Jess Hindley	Subject lead: Justin Cowley	Overview: Computer Networks and systems: Compare digital and non-digital devices. Be introduced to computer networks, including devices that make up a network's infrastructure, such as wireless access points and switches.	Key End Points: By the end of this unit children will be able to:

Links to other learning:	Prior Learning:	Future Learning:	High Quality Text:	Risk Assessment:	Misconceptions:	Teacher CPD:

	Learning Intention	Lesson Outline (Key Questions in colour)	Resources	Vocabulary	Lowest 20% Adaptations
1	- I can explain that a digital device accepts inputs and produces outputs	**Computing is the use of devices to create, store and manipulate data** In this lesson we are going tointroduce the concepts of **input**, **process**, and **output**. These concepts are fundamental to all **digital devices**. Show the first slide and click through the images on the slide and ask the class which of the digital devices shown on the slide they recognise, and whether some or all of them have anything in common. When the final image has been displayed, tell them that all the images are of digital devices. Explain to the class that through the lessons in this unit, they will develop their understanding of digital devices, how these can be connected, and what the benefits of connecting them are. Display slide 2. Show the class images of a range of objects, and ask them how they would sort them into two groups. Record their responses and discuss ideas, eg "objects that are the same colour", "objects that have buttons", or "things that you play on". Discuss how they have sorted the objects, emphasising that there is not a 'right' or 'wrong' way of sorting them. Display slide 3 and show them one method of sorting the objects. Ask them why they think the objects have been sorted in this way. A **misconception** may be that the groupings are 'electrical' and 'non-electrical' — if this were the case, the torch and lamp would be in the other group. Explain to class that: ● The objects are grouped into digital and non-digital devices ● A digital device processes information digitally, which means that it does something beyond being either on or off Display slide 4. Explain that we can tell whether something is a digital device by applying the 'input, process, output' model.	Powerpoint Activity sheet - inputs	Digital device Input Output Process	Set of picture steps to create a sandwich which the children must put in correct order.

Open a word processing program, such as Microsoft Word and demonstrate pressing buttons on the keyboard (the **input**). Then, discuss what the computer is doing: following the program for the button that you have pressed (**process**), and then showing the correct letter on the screen (**output**).

The slide illustrates the 'input, process, output' model that you have just demonstrated, and you and the children will explore this model in more detail throughout the rest of the lesson.

Display slide 5, which includes animations for you to click through to demonstrate examples of processes. First, demonstrate a simple process to learners: taking a football or star (an input) and passing it through the machine so that it gets bigger (an output). Ask learners to explain what process the machine is carrying out.

Demonstrate a second process, and ask learners what process the machine is carrying out (multiplying by two).

Show a machine that carries out a process using numbers (2 becoming 4). Ask learners to discuss whether there is more than one possible explanation for the machine's process.

Show an additional example (5 becoming 7) and ask learners if they can now explain the machine's process.

Finally, show the process. Discuss with learners whether the machine works with any number.

Display slide 6. Tell the class that they will now find the inputs, processes, and outputs for the machines on the Activity sheet (saved in resources). Check children's understanding of the activity sheet — this could include relating the activity sheet to prior learning in maths — then, ask learners to complete the activity sheet.

Display slide 7. Review the answers with the class.

Display slide 8. Ask them to create an 'input, process, output' machine on the Activity sheet – 'processes'. This is an opportunity for the children to demonstrate that they can apply the learning from the previous activities. They may choose to process images (for example, something becoming larger or smaller) or numbers (any operation).

Extension task: Ask the children to discuss what the input, process, and output are when opening an app or program on a laptop or tablet. For example, would they use the keyboard to do this? Learners should suggest the following process: "I use the trackpad or touchscreen (input); the program tells the computer what to do when I tap or click on this picture (process); the screen shows that the app or program is now open (output)".

| 2 | - I can explain how computers are connected | **Computing is the use of devices to create, store and manipulate data**
In this lesson we are going to introduce the concept of connections and moving information between connected devices. We will learn to explain how and why computers are joined together to form networks.

Display the first slide and introduce the word 'connection' and ask the class what they think this word means. Click on the slide to reveal the answer. Discuss how they might be connected to different people.

Display slide 2. Explain to the class that they will be looking at the connections that they have to other people. Ask them to write their name in the centre of the next page in their book. Then, ask them to add names or drawings of 5 to 10 people that they have a connection to, eg parents, carers, extended family, friends, professionals such as teachers or doctors, etc. Ask them to draw connecting lines between themselves and other people.

(Some children may benefit from a more concrete context for this activity. Tell them to imagine that they had some good news, such as being awarded a school certificate or another achievement, and to think about who they would like to tell about it. Explain that they have connections to these people.)

Vocabulary | Lesson Powerpoint Becoming a network resource | Connection Network Network switch | |

Display slide 3. Introduce the word 'network' and ask them what they think it means. If required, split the word into the terms 'net' and 'work' and discuss each term independently. Explain to the class that the people that they are connected to also have connections with each other, which creates a 'net' of lines. These connections help us 'work' together to do things that we need to. Ask the children to give examples of groups of many people or things connected together.

My network
Display slide 4. Ask them to look at the connections that they have drawn so far and to think about whether there could be any additional lines between people, eg between Mum and Dad. Then, ask them to draw lines in a different colour to represent these connections.

Display slide 5 to show the children an example of people that they could be connected to, and explain that this is the **network** of people that they know. Explain that a network is a number of connections linking things with each other, eg people, roads, or computers.

Ask learners to discuss how a message might be passed between people in their network (or in the example network on slide 7). For example, ask them to discuss how they might get a message to Grandma D, and to suggest different ways, eg telling her directly, asking their dad to tell her, asking their brother to ask their grandad to tell her, etc.

Explain to the class that they are now going to represent computers on a network (illustrated on slides 6 and 7) and see whether they can find the best way to send messages around it.

Display slide 8. Give the children some squares from the resource sheet (saved in resource folder) to use for their messages. Display slide 9. Explain that they should write a message (such as "I like chicken nuggets" or "Do you want to play at lunch?") to someone on a different table than their own. Tell them that they can write up to five messages, but for now, they should keep the messages piled on their own table.

(To ensure that no learner feels excluded, either ask learners to send one message to a friend and another message to the person who comes after them in the register)

Ask them to stop writing. Display slide 10, and explain that they are now going to become parts of the network passing these messages around. Explain that networks cannot walk, so they need to stay seated. Click on slide 10 to reveal the illustration, then display slide 11. Tell learners that they should pass one message at a time, from one person to the next, checking each time who the message is going to and then sending it roughly in that direction.

Note: If required, discuss the importance of patience with learners, as quite often in this activity, someone who they attempt to pass a message to will be looking the other way. Explain that this is not because they are deliberately ignoring them — there are just a lot of messages to be passed!

Note: Learners seated in the middle of the room will be more involved in this activity than those seated around the edge. You may therefore wish to move learners around and complete the activity twice.

Discussion

After they have passed messages around their network, display slide 12 and ask:
- Is this a good way to share information?
- How is the network working?
- What is working well?
- What is frustrating?

Some answers that learners might suggest are:
- Messages are going in the correct direction
- It is slow to get messages around
- Some people have more messages to pass than others (people between two tables)
- People are sometimes looking the wrong way

		Explain to the class that the network that they have just made is similar to a computer network, although such a network often includes hundreds of devices, in different rooms, all over the building. Explain that it is not practical for all of these devices to connect directly to each other. To illustrate this point, ask them to imagine one laptop with 50 things plugged into it, which would be impractical. Invite the class to suggest ways in which the sharing of messages could be carried out more efficiently. Explain to them that they will now look at ways to make the process of sharing information more efficient. Display slide 13 and explain the function of a switch (or switches) in a network. Nominate one member of the class to represent the **network switch**. Explain that this person will collect messages from one learner and then distribute them to all of the receivers. Click through slides 13 and 14 to demonstrate the process to the whole class. Explain that: ● This is a more efficient way of sending and receiving messages, and it is a representation of how a computer network functions ● A network switch is a device that enables multiple devices on a network to be connected ● When one computer wants to send information to another computer, it can now do so via the network switch; information does not need to go through other computers **Note:** Most school networks have one switch, although some larger schools have more, especially if they are split over more than one site. Ask one learner to pass a message from Activity 2 to another learner **via the person who represents the network switch**. In their books, ask the children to answer the following questions: ● What is a connection? ● How can we share information effectively between connections? ● What does a network switch do?			
3	- I can explain the role of a switch, server and wireless access point in a network.	**Computing is the use of devices to create, store and manipulate data** In this lesson we are going to introduce key network components, including a server and wireless access points. We will examine each device's functionality and look at the benefits of networking computers. Display the first slide and remind them that a network is made up of connections between many people or objects. This is illustrated on the slide with the example of a personal network consisting of connections between family members and friends. Display slide 2 and let the animation play. The animation will show connections between children in a classroom, but with no organisation or structure. Ask them if they think that this is a good way of making lots of connections. Display slide 3 and let the animation play. The switch is connected to every computer and can therefore pass information from any computer to any computer. The animation will demonstrate that a switch makes connections more efficient, as there does not need to be a direct connection between each pupil and each other pupil. Explain that the messages pass from the sender to the switch, and then the switch forwards them on to the receiver. The switch does not read the messages; it just sends them to the right place. Display slide 4. Explain that, like in Lesson 2, some class members will now role-play to recreate the school network, but this time, the roles will include a number of new types of network devices. The network will start out with a small number of devices, but more devices will join and the network will grow. Note: For this activity, you will need to use printed images from the resources to remind learners which device they represent. First, ask the children to role-play the network as it was at the end of Lesson 2, ie a small number of desktop computers (4 or 5) connected to a switch in an arc. Use pieces of string or skipping ropes to represent the connections between the network switch and each of the desktop computers. The person representing the network switch should hold one end of each string, and each person representing a desktop computer should hold the other end of one string each.	Role play images Skipping ropes (or string)	Server Wireless access point Switch	

Remind them that when one computer wants to send information to another computer, it can do so via the network switch; the information does not need to go through any other computer.

Ask one child to pass a note to another child via the person representing the network switch.

- How could a file travel from computer 1 to computer 2?

Answer: Computer 1 would send the file to the network switch. The network switch would direct the file to computer 2, which would then receive it.
- What would happen if one computer was switched off?

Answer: You couldn't send anything to it or get anything from it.

Display slide 6. Explain that many networks contain a server, which is an important computer that stores files and manages the network.
Display slide 7. Use the slide to show the class where a server is connected to a computer network. Explain that the desktop computers can access the server via the switch.

Ask another child to role-play the server in the network. Give the child one end of a piece of string, and give the other end to the child representing the network switch, to represent connecting the server to the network switch.

Demonstrate to everyone how we can use our network model to follow the journey of a file. Ask them to pretend that a teacher using computer 1 creates a file, then saves that file on the server:

1. The child role-playing computer 1 holds a piece of paper (this represents the file that has just been created)
2. A child takes the piece of paper (representing the file) from computer 1 and follows the piece of string until they reach the network switch
3. The child role-playing the network switch points in the direction of the child role-playing the server
4. The child carrying the file (the piece of paper) follows the piece of string to the server and passes the file to the server

Note: The benefit of saving files on a server is that they can be accessed from any device on the network (with appropriate permission). Also, most servers are backed up on a regular basis, which means that file storage is likely to be more secure and reliable than on a personal device.

- Where is the file now?

Answer: Saved on the server.
- Which computers can access a file on the server?

Answer: Any computers connected to the network.
- Would it matter if computer 1 was now switched off?

Answer: No, because other computers can still access the file on the server.

Display slide 9. Give them an opportunity to role-play a network including a server. One child will represent the switch, one will represent the server, one will carry the message, and the rest of the group will act as desktop computers. Emphasise to them that they should use the new vocabulary throughout the activity, including the terms 'network switch' and 'server', and that they should explain the function of each **device.**

Stop the previous activity and select one group of children to remain in their positions. You could add a few more children representing desktop computers to the group too. Explain that some devices in a network are not connected by wires. Ask children how they think a tablet computer or a laptop computer can connect to the school network. Explain that this connection takes place via wireless networking (Wi-Fi).

Note: A Wi-Fi connection is not an internet connection; it's just a wireless way of connecting to a network. Equally, learners may mention 3G, 4G, or 5G connections, which connect devices (usually smartphones) to the internet and not solely to a network.

Display slide 10. Explain that, because wireless devices do not have wires that connect them to the network switch, they need to connect to a device called a wireless access point (WAP), which in turn connects to the network switch. Explain that a wireless access point is a device

		connected to a wired network via a wire, and that it sends and receives wireless signals for and from devices with wireless connectivity. In most schools, wireless access points will be in every classroom and in communal areas.
		
		Display slide 11. Ask approximately 6 learners to role-play wireless devices (this time, not using string), eg laptop computers or tablet computers. Ask another child to represent the wireless access point, and explain that they will connect the wireless devices to the network switch. Give the learner one end of a piece of string, and give the other end to the child representing the network switch, to represent connecting the wireless access point to the network switch, like the desktop computers.
		
		Ask the children to now demonstrate the journey of a file on the server to a wireless device. Explain that this time, the teacher is using a laptop to open a file, and the file (or the request for the file, at first) will need to move:
		    1. From a wireless device to the wireless access point
		    2. To the network switch
		    3. To the server (the child should pick up the file)
		    4. Back to the network switch
		    5. To the wireless access point
		    6. To the wireless device (the child should hand over the file)
		
		Ask:
		    ● What do you need in order to access information on the network via a laptop?
		Answer: You need a wireless (Wi-Fi) connection.
		
		Display slide 12. Show learners the key vocabulary used in today's lesson, and ask them to match the words with the definitions.
		
		Show slide 13 to reveal the answers.			

4	- I can identify network devices around me	**Computing is the use of devices to create, store and manipulate data**
		In this lesson we are going to further develop our understanding of computer networks. We will see examples of network infrastructure in a real-world setting and relate them to the activities in Lesson 3.
		
		Click through the animations on slides 1 to 3 to remind the children of three network components that were introduced in the previous lessons.
		
		Ask them to discuss what the network components that were introduced in the previous lessons do.
		
		Display slide 4. Explain that a number of other components are part of a network, including:
		    ● Network (Ethernet) cables
		    ● Network (Ethernet) sockets
		
		Click through the animations on slide 4 to show the definitions of 'network cable' and 'network socket'.
		
		Ask the children the following questions. Once they have discussed these questions, invite them to give feedback to the class:
		    ● What kind of tasks does the school network let children and staff members do?
		        Possible responses: On the school network, files can be accessed and shared, staff members can access the register and administration system, and messages can be sent easily between people. **Note:** children may also talk about being able to access the internet. This is possible on most networks, however, a computer does not have to be part of a local network to connect to the internet, as is the case with many home computers.
		    ● Why is it useful for more than one person to be able to access information in school?
		        Possible responses: It is useful because it means that information such as attendance information or shared projects can be accessed by more than one person, meaning that such information only needs to be entered once. Communication between staff members and learners can be more effective.
		
		Explain that they are going to go on a brief tour of the school to find the key components of the computer network discussed in the unit so far:
		    ● Devices
		    ● Printers or copiers
		    ● Wireless access points (WAPs)
				Network cables
				Network sockets
				Server
				Switch	

		• Network (Ethernet) cables • Network (Ethernet) socket • Switch (in library, also one in Yr5 store cupboard) • Server (in strong room) They may also find other network devices, such as routers or firewalls. During the activity, remind them how information moves around a network. **Explorer task:** As learners are finding the different network components, ask them to consider the purpose of each device: Display slide 7. Remind the class how the parts of a network that they have seen during their network tour combine to form a network. Click through the animations on the slide to show how the following are connected: • Switch, server, and printer • Desktop computers • Wireless devices (laptop computers and tablet computers) Display slide 8. Ask them to recap what a computer network is, and to discuss how networks can help us. For example, they might say that they can share files, and all staff members can access the register. **What about the internet?** Display slide 9. During Activity 2, learners may have mentioned the internet at home, or the school internet connection. Explain to learners that the school network is connected to a **router.** The router provides a connection to the internet through an external cable.			
5					5