

SECTION

2

DIGITAL DEVICES,
EXAMPLES AND
IMPORTANCE



ICTs IN THE SOCIETY

Emerging Technology and Applications

INTRODUCTION

Hello Learner! This section will introduce you to how digital devices are crucial for modern society. You will examine current and emerging digital devices and describe their purpose and uses. You will also explore smart technology, wireless connectivity and the link between the growth in the use of smartphones with the transformation of social media. At the end of this section you should be able to use various digital devices in daily activities.

At the end of this section, you should be able to:

- Explain digital devices and their importance
- Differentiate between desktops, laptops, smart gadgets (tablets), and servers.
- Explore the purpose and uses of smartphones, digital cameras, wearable devices, game devices, eBook readers, portable and digital media players.
- Explore the purpose and uses of smartphones, digital cameras, wearable devices, game devices, eBook readers and portable digital players.

Key Ideas

- A digital device is an electronic device that processes and stores data in a digital format.
- Digital devices are important because they play a crucial role in modern society by enhancing various aspects of daily life. They facilitate instant communication, allowing people to connect with others globally through emails, messaging apps, and video calls.
- Digital technologies in education have transformed the way learners learn and how teachers instruct, making education more accessible, engaging, and effective.
- Computers are digital devices and can be put into various groupings. For example, personal computers (e.g., desktops, laptops, tablets), servers, smart gadgets (e.g., smartphones, smart speakers, smart watches).
- Servers are central computers that house and share resources with other computers (clients) on a network.
- Knowledge of the various types of computers is important as it helps potential users to make the right choices depending on their user needs.
- A smartphone is a multifunctional mobile device that can make calls, send texts, browse the internet, take pictures, play games, and access a wide variety of apps.
- A digital camera captures and stores digital images.

- Wearable devices are electronic devices that are worn on the body. They can track a variety of data, be used to make payments and control smart home devices.
- A game device is an electronic device that is designed for playing video games.
- An e-reader is a portable electronic device that is designed for reading eBooks. e-readers allow you to carry a large library of eBooks with you wherever you go.
- A portable media player is a device that can be used to play audio and video files. Portable media players allow you to listen to your favourite music on the go.
- A media player is a device or software that plays audio and video files.
- Digital smart devices are portable, can connect to the internet, and be controlled remotely. They use different types of wireless connections, such as Bluetooth, infrared, and NFC.
- The Internet of Things (IoT) describes physical devices with sensors, software, and other technologies that connect and exchange data with other devices and systems over the internet.

DIGITAL DEVICES

Digital devices have become an integral part of our daily lives, shaping the way we communicate, work, learn and entertain ourselves. From smartphones and laptops to tablets and smartwatches, these devices have transformed the way we interact with technology. In this digital age, understanding the significance of digital devices is crucial for navigating the modern world.

Analogue and Digital

An analogue signal is a signal that changes smoothly over time. An analogue device sends and receives data in a continuous flow, like a traditional clock or a dimmer switch. In contrast, a digital signal has only two states: 'on' or 'off', with no in-between. Digital signals are made up of pulses that are either 1s or 0s.

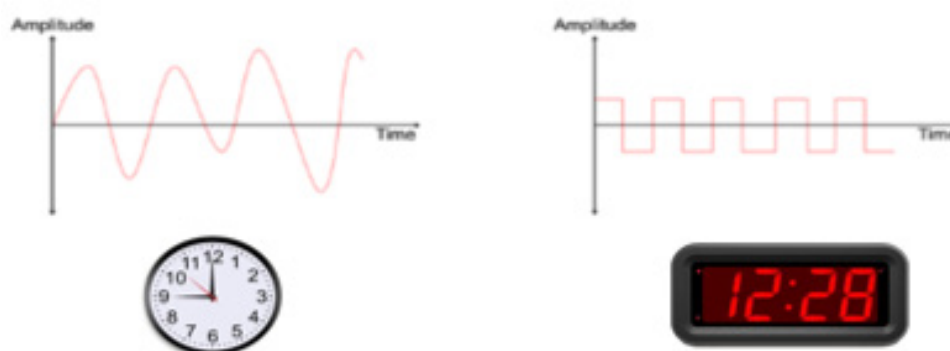


Figure 2.1: Analogue signal and clock, and digital signal and clock

What is a Digital Device?

A digital device is an electronic tool that can create, send, share, receive, store, and show digital data. Digital devices turn information into binary code, which is made up of zeros and ones. Analogue devices, on the other hand, turn information into electric pulses with different strengths. Digital devices are more accurate, can store data better, and handle more data than analogue devices. Examples of digital devices are personal computers, digital clocks, gaming consoles, and smartphones.

Why are Digital Devices Important?

The reasons that digital devices are important are many and can vary depending on how and where the devices are being used. The reasons for their importance includes:

1. They can quickly process data for a variety of purposes.
2. They are able to provide quick access to information.
3. They are compact, faster, lighter and more versatile than non-digital devices.
4. They are able to store and move huge amounts of information locally or remotely and move it around virtually instantaneously.
5. They are able to automate tasks.
6. They can work 24/7.
7. They are able to break down distance barriers and allow people from different parts of the world to communicate instantly.

Digital technologies have changed almost everything in modern life. They have revolutionised areas like education, travel, work, shopping, entertainment, and communication. These technologies save people time and money in their personal and work lives by automating tasks, making it easier to connect with others, and reducing the need to travel as much.



Figure 2.2 Some areas where digital devices are commonly used today

Watch the following video on how technology has made our lives easier:

How Has Technology Made Our Lives Easier? (4 mins)

YouTube Video link: <https://www.youtube.com/watch?v=ZDzjqmU43Vw>



Activity 2.1

Read the scenario below and answer the question that follows it.

Scenario

In Ghana, digital devices have become integral to everyday life, transforming communication, commerce, and entertainment. From busy cities to remote villages people purchase smartphones, tablets and smart TVs to stay connected with loved ones, access information and enjoy entertainment. Farmers like Akwesi utilise mobile apps to optimise crop cultivation, whilst entrepreneurs like Salamatu can expand her business online. Whether checking the weather forecast, conducting mobile payments or streaming Ghanaian dramas, digital devices empower Ghanaians, enrichen their lives and drive progress in the country.

Now answer the question below:

Identify at least three digital devices in the scenario. Compare your answers with a partner and add any additional devices identified by your partner to your list.

DIGITAL TECHNOLOGIES IN EDUCATION

Digital technologies have become integral to education, transforming traditional learning environments and methodologies. Their influence spans various aspects of the educational experience, from enhancing access to information to personalising learning experiences. Here are some key areas where digital technologies are making a significant impact in education.

1. Increased student engagement.
2. Access to a vast range of interesting and up-to-date resources.
3. Improved lesson plans for teachers.
4. Personalised learning.
5. Building essential 21st Century skills.
6. Increased scope for distance learning.

Watch the following video on the benefits of using technology in education:

YouTube Video link: <https://www.youtube.com/watch?v=oDAkGCsTsyA>

What is Digital Learning?

Digital learning is any type of learning that uses digital technology. This usually involves using computers and often the internet. Some examples of digital learning are:

1. Classroom technologies using special software, hardware, and the internet
2. Online tutoring
3. E-textbooks
4. Social media
5. Multimedia
6. Online games
7. Mobile phones
8. Audio podcasts

Nowadays, teachers and students can access many online resources. For example, Twinkl, an online educational publisher from the UK, offers a lot of fun learning materials, including resources for ICT courses.



Figure 2.3 A slideshow on Twinkl that can be downloaded

The Difference between Digital Learning and E-Learning

Digital learning	E-learning
<p>This uses digital devices such as computers and internet connectivity to help with learning, whether students and teachers are in the same room or not. It can give access to a range of different materials that can support learning such as videos, interactive quizzes, and online courses</p>	<p>This is a type of digital learning that is fully online, so the learning happens remotely. Students and teachers are in different places and use online tools and platforms like Teams, Zoom, Google Classroom, Gmail, WhatsApp, Facebook, to communicate.</p> <p>In many parts of the world, schools are increasingly using e-learning to add to the learning done in the classroom. For example, homework might be set online. Blended learning is the term used for combining traditional face-to-face learning with online technologies.</p>

Recent Acceleration of Digital Learning

The COVID-19 pandemic caused the largest disruption in education history, affecting an estimated 1.6 billion learners in over 200 countries. School closures impacted more than 94% of the global learner population. During lockdowns, digital learning became the sole means of continuing education, leading to a significant rise in the use of digital technologies across all education levels.

Advantages of Digital Learning

Digital learning offers numerous advantages, transforming traditional educational methods and providing new opportunities for learners and educators alike. Advantages include:

1. **Personalised Learning:** Digital learning can help make education more personal by matching the teaching methods to each student's needs. It allows students to learn in a way that suits them best and at their own pace. Digital tools also offer extra help, like screen readers for students who need them.
2. **Improved Learner Engagement:** Using multimedia like images, audio, and video in lessons can make learning more interesting and fun. Digital devices can turn boring subjects into interactive and enjoyable experiences.
3. **Increased Access to Materials:** With the internet and portable storage, learning resources are available anytime—24/7. This means students can study when and where they want, review lectures, and access global resources. Recorded lectures can help with note-taking and allow students to revisit tricky topics.
4. **Cost-Saving Education:** Many e-learning courses are free and can be completed from home, saving money on travel and other expenses.
5. **Variety of Learning Tools:** Digital learning often uses computers or tablets, which means students can easily back up their work. Files can be saved on a computer or in cloud storage and accessed from different devices in any location. Tools like spellcheck can help correct mistakes in essays and reports.

- 6. Facilitates Collaboration:** Students and teachers can easily share documents through school networks or the internet, making collaboration easier. Allowing students to work in groups on documents

Overall, digital learning enhances the educational experience by making it more flexible, engaging, and accessible, while also preparing learners for the demands of a digitally connected world.

Disadvantages of Digital Learning

Digital learning, while offering numerous advantages, also comes with several disadvantages that can impact learners, educators, and the learning process itself. Here are some of the disadvantages:

- 1. Less social interaction with peers and facilitators:** Digital Learning can reduce the face-to-face interactions, meaning that students can find it more difficult to collaborate with each other.
- 2. Technical problems can disrupt learning:** Slow internet, poor hardware and software crashes can mean that some activities may not be possible, or even that learning cannot take place sometimes.
- 3. Unequal access to technology and the internet:** Not everyone has access to the same access to the latest technologies and as such some learners could have very slow internet, or older hardware, meaning that they struggle to be involved, or minimise their access to the lessons and activities.
- 4. Quality of education can vary:** Just because a course is available, it does not mean that they are always the best quality, there are thousands of courses that can be studied, but the quality should be checked.
- 5. Health issues from too much screen time:** Extended use of digital devices can lead to eye strain, poor posture and other health problems, especially if regular breaks are not taken
- 6. Difficult to ensure honesty in online tests:** It can be more difficult to monitor tests done remotely to ensure that people don't cheat and that the tests are fair.
Hard to teach hands-on skills online: There are some subjects that are much easier to teach in person such as art, science where practical sessions would support learning.

Perhaps the biggest disadvantage of digital learning is the digital divide. When we talk about the digital divide, we are referring to the percentage of people who have access to the internet and digital devices and the percentage of those who do not. Digital learning is not an option for those who have no access to either an internet connection or a computer or mobile phone.



Figure 2.4: A gap exists between those who have affordable access, skills, and support to effectively engage online and those who do not

Digital learning needs a digital device. Some families can't always get these devices. Many only have one shared device, like a desktop computer, or none at all. The monthly cost of internet can be too high for some families. Software like word processing or spreadsheet programs can also be expensive. Luckily, some companies offer programs with very similar features for free, but they often don't have all the features.

Learning materials for online courses are occasionally given out on CD-ROMs or flash drives, but normally, you need to access, or download, them from the internet. Internet reliability and speed can be different depending on the country and location. In rural areas, only slower internet connections might be available.

People taking online courses need some level of digital skills to complete their studies successfully. Learners often have to join video calls (which need webcams, microphones, and speakers) and send emails or upload work. For those who are not familiar with using a computer or the internet, this can make it much harder to follow the materials and participate in the lessons.

Activity 2.2

Read the scenario below to answer the following questions. Share your answers with your teacher or colleagues:

Awuni's ICT facilitator gave the class an assignment to research on the history of Ghana and print out at least two (2) pages of their findings for submission the following day. Awuni was able to do the work by using an internet café to access the Internet, search, type and print a summary of his findings. This was then submitted it to his facilitator as expected.

1. What digital devices did Awuni use to access the Internet, compile and print his findings?

2. Which digital device did the internet café use to connect to the internet for users like Awuni to access?

3. Mention at least four other digital devices used in society?

Having completed Activity 2.2, let's use the experience gained so far to identify at least one digital device that can be used in each of the following situations. Try to think of as many different digital devices as possible.

4. An author writing a book for publication.

5. A journalist in a car posting news feed to TV studio.

6. A graphic designer creating a poster.

7. A call centre manager receiving and making a call.

8. A teacher presenting a lesson using a PowerPoint presentation

9. A student needing an internet connection to watch a YouTube video for extended learning.

10. A bank offers its services its customers even after working hours.

11. A farmer that uses ICT tools in his farming activities.

INTERNET USAGE IN AFRICA

As of January 2024, Nigeria had more than 103 million internet users - the highest number reported all over Africa. Meanwhile, Ghana ranked sixth with over 24 million users.

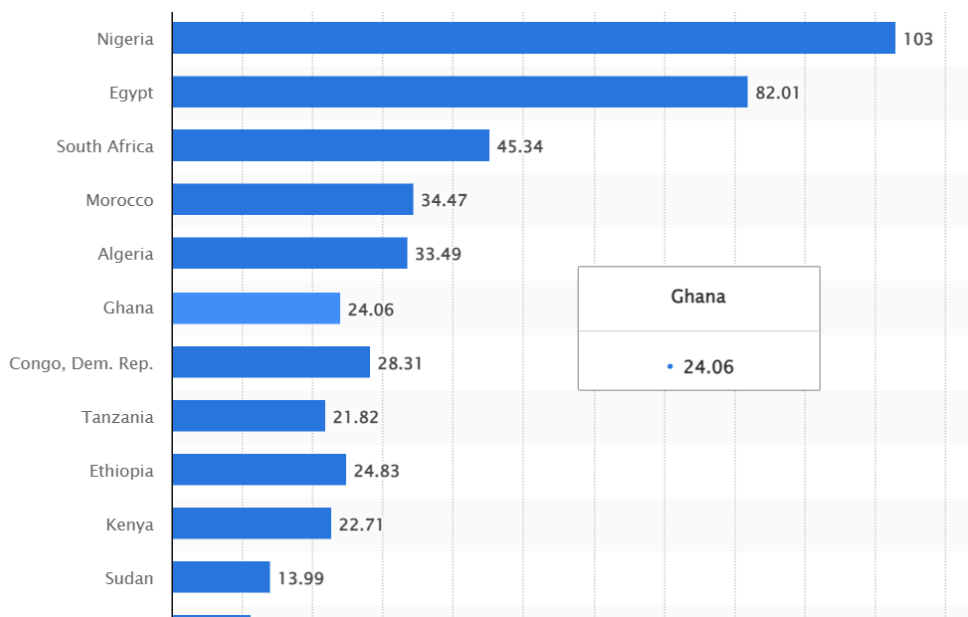


Figure 2.5: Top 11 internet users in Africa as of January 2024, by country (in millions)

Activity 2.3

Digital devices have been useful to mankind in modern world of digitalisation. In a group, choose at least one sector of society from Travel, Retail and Banking. Research and create a slideshow under the following headings:

1. Digital devices used in [sector name]
2. Uses of the digital devices in [sector name]
3. Why digital devices are important in [sector name]
4. Include images in your slideshow and as a group, present your findings to your class.

Conclusion

The way we learn has changed a lot in recent years. Digital technology has been a big reason for this change. Digital technologies have made learning more engaging for us as learners and teaching more effective, leading to better results. Digital technologies will keep evolving and having an impact on education.

The evolution of Artificial Intelligence (AI) and the impact this will have in education is still unclear. However, AI is expected to bring more changes, such as personalising learning experiences, automating administrative tasks, improving accessibility, and providing more real-time feedback to both learners and teachers.

Before you proceed, try and answer these questions

In what ways do you think the knowledge of types of computers and how they differ in terms of size, usage, processing power, type of processor or CPU, and applications is beneficial to individuals and organisations?

Assume you have a computer, what would you use it for?

Which type of computer would you prefer given the option to choose, and why?

Have you noticed any differences in the computers used by people in your community and those at your school lab? **[Popup]**

MAIN FEATURES OF DIGITAL DEVICES

Personal Computers

All computers are digital devices. Digital devices can be categorised in various ways depending on their usage and other factors. The knowledge of types or classifications of computers is essential to the average individual in the digital world since as it helps users to make an informed decision, with regards to which type of computer to choose,

depending on their processing needs. You might have come across some of these classifications already in your previous studies, including personal computers (PC), servers, and smart gadgets (devices).

A personal computer, often referred to as a PC, is a computer designed for individual use. There are several types of PCs, including desktops, laptops, tablets and smartphones.



Figure 2.6 Examples of PCs

Desktops – See 1 in Figure 2.6

A desktop computer is a type of computer intended for regular use at a single location due to its size and electrical power requirements. It derives its power from mains power only that is, Alternating Current (C). In most modern desktops, the input devices (e.g., keyboard and mouse) and the output devices (e.g., screen or monitor) are separate from the system unit or tower, also known as system cabinet (the case that contains the processing circuitry). The internal storage devices are typically a solid storage device (SSD) or a hard drive and in some cases an optical disk drive. Modern desktop computers come with built-in wireless communications capability.

Desktops are a suitable option if you work mostly in one place and have plenty of space. With the correct hardware (including a network interface card), desktops can become workstations on a network.



Figure 2.7 Examples of Desktop computers

Laptops -- See 2 in Figure 2.6

A laptop, also called a notebook computer, is a thin lightweight mobile computer. It is designed to fit on your lap and to be easily transported. It can operate both on batteries and on a mains power supply. Ultra-thin laptops weigh less than traditional laptops, and usually have a longer battery life. Laptops have built-in input devices such as a keyboard, touchpad and webcam, and built-in output devices, such as a screen and speakers. Some laptops have touch screens. The internal storage devices are typically solid-state storage (SSD) or a hard drive and an optical disk drive in some cases. Nowadays, laptops have built-in wireless communications capability. A convertible laptop, also known as a 2-in-1 laptop, is designed to function as both a laptop and a tablet. It has flexible hinges to allow the keyboard to fold away from the screen or spin(swivel) to act as a tablet stand.



Figure 2.8 A convertible laptop

Laptops are designed for personal use and can perform similar functions to desktops, such as browsing the internet, creating documents, and playing games. With the correct hardware (a network interface card), laptops like desktops can become workstations on a network. As laptops are generally smaller in size than desktop computers and are battery powered, they are suited for work use on the move such as business trips. Laptops allow employees to stay in touch with their employer using email and video chat while having files, software and data readily at hand.

Tablets-- See 3 in Figure 2.6

A tablet is a thin, lighter weight mobile computer that has a touch screen. It is usually smaller in size than laptops but larger than a phone. As an alternative to interacting with the device using touchscreen, a separate physical keyboard can be attached to it through cable or wirelessly to communicate with the tablet.

Like a laptop, a tablet can run on batteries or mains power.

Two popular form factors (shapes and sizes) of tablets are the slate and convertible. A slate tablet is the classical form of tablet with a touch screen and no keyboard. It can be operated with a stylus or fingers and can be held like a clipboard. A convertible tablet is a tablet that has a screen with a lid and a keyboard in its base, with the lid and base

connected by a swivel-type hinge. You can use a convertible tablet like a traditional laptop, or you can rotate the display and fold it down over the keyboard so that it looks like a slate tablet.



Figure 2.9 Examples of Tablet PCs

Tablets are useful for taking notes in class, at meetings or at conferences.

Servers

Server computers are the lifeblood of any client-server network since they constitute the main component that enables the network to function. In essence, they serve (provide) services to network users (who are generally referred to as ‘clients’). These services include file storage, web hosting, application storage, peripheral device sharing, and database management. For example, when you log on to a school’s or work network, a log-on server will check that you have a valid account. Then the file server will connect you to your user area and any other storage areas such as the student shared area. A school or company’s website is stored on a web server and email comes from an email server.

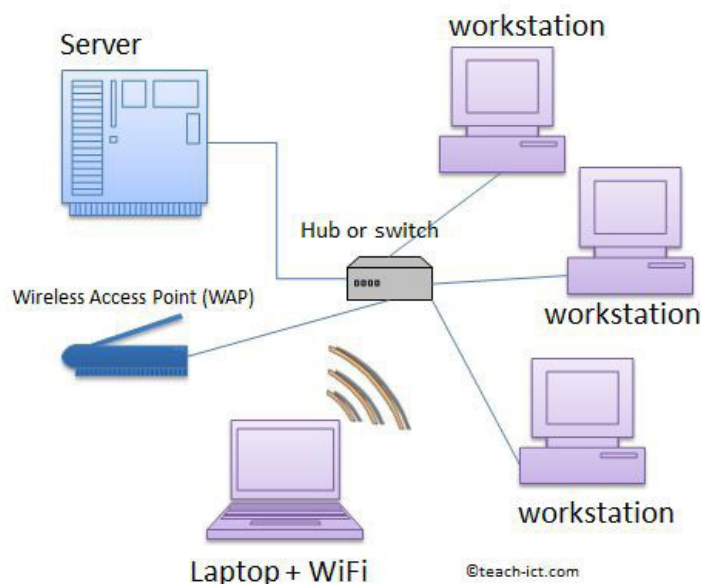


Figure 2.10 A possible layout of a client/server network

So, servers on a network provide services to clients, while computers (clients) connected to a network (workstations) request services from servers.

On the Internet, servers, also referred to as hosts (host computers), houses the information or resources that users need. Servers are designed to handle many requests, while workstations are designed to be used by one user at a time. Servers also differ from regular computers in their specifications: typically, more powerful, with more RAM and reliable power sources.

Smart Gadgets

Other than being less formal, the word ‘gadget’ is interchangeable with ‘device’ when referring to a physical object. A smart gadget or smart device is an electronic device that uses the internet to connect to and communicate with other devices or networks to complete a task or solve a problem. They are often designed to perform specific tasks with improved efficiency and convenience. Smart gadgets have become an integral part of our lives, offering a multitude of benefits that enhance our daily routines.

Examples of smart gadgets include:

1. Smart speakers
2. Smartphones
3. Smartwatches
4. Smart TVs
5. Smart lighting systems
6. Smart thermostats
7. Smart security cameras and systems
8. Smart kitchen appliances e.g. smart refrigerators

A smart device is any computer-controlled electronic apparatus either than a desktop, laptop or tablet computer, which are technically ‘intelligent’ devices. Although some books and websites refer to a tablet as a smart gadget, a tablet is better classified as a PC.

Smart devices and gadgets are covered in more detail shortly however let’s start by having a closer look at smart speakers.

Smart speakers

Smart speakers are connected to a Wi-Fi network and operate via voice commands. They are capable of streaming audio content, relaying information, and communicating with other devices.



Figure 2.11 Examples of smart speakers

DIFFERENCES BETWEEN COMPUTER TYPES

Differences between desktop computers and laptop computers

The table below shows the differences between desktop computers and laptop computers.

DESKTOP COMPUTERS	LAPTOP COMPUTERS
They are not portable and run only on a mains power supply.	Laptop computers are portable and can run on battery as well as mains power supply.
Need external devices to be fully functional and are larger in size.	Laptop computers are all-in-one computer systems and are smaller in size.
Desktops can have multiple internal drives.	Laptops usually have limited capacity for storage upgrades.
Require external input devices such as the keyboard and mouse to be connected for input.	Have keyboard and mouse in-built.
On average, have a lower cost of purchase and maintenance.	On average, have a higher cost of purchase and maintenance.
Can easily be upgraded as the components are easily removable.	Upgrades are not that easy or impractical in some cases.
Desktops generally consume more power.	Laptop PCs consumes less power.

Activity 2.4 – Comparing computer types

As individual or together with your colleagues (recommended), compare the given types of computers under the parameters indicated in the table below. Use general entries (descriptions) such as *slower* and *much more powerful* for processors or be more technical and include typical number of cores and clock speeds.

PARAMETER OF COMPARISON	TYPE OF COMPUTER			
	Desktop	Server	Laptop	Tablets
Portability				
Form factor				
Processor				
Internal storage				
Peripheral devices				
Typical uses				
Typical user				
Cost				
Image				

Use the space below to reflect on Activity 2.4. How did you find the activity? Include any notes that will help you to complete the task in the future.

Activity 2.5

1. Visit some companies operating in the sectors listed below in your locality or search from the internet to find out which devices they use for digital data processing:

Sectors

- a. Communication
- b. Education
- c. Entertainment
- d. Health
- e. Business

2. Summarise your research findings in (a) above under the following headings:

Type(s) of computers used	What the computers are used for	Application software used	Benefits of computerisation in the given sector	Drawbacks, if any, in the use of computers in this sector

3. Use a computer to digitise (type) and share a summary of your findings with your teacher and colleagues.

THE PURPOSE AND USES OF SMARTPHONES, DIGITAL CAMERAS, WEARABLE DEVICES AND GAME DEVICES.

We are now going to study the purpose and uses of smart phones, digital cameras, wearable devices, game devices, e-readers and portable media players. These devices have become essential to human lives. They help us in planning our day-to-day routines, capture memorable events and even entertain the family. You will discover more about smart devices and how to make maximum use of them.

Let's now explore on these devices in detail.

Smartphones

A **smartphone** is a multifunctional mobile device that can make calls, send texts, browse the internet, take pictures, play games, and access a wide variety of apps. Smartphones allow you to make voice and video calls, send text messages, and emails.

A smartphone is a mobile phone that, as well as providing connection to a cellular network, performs many of the functions of a computer, typically internet access

and an operating system capable of running downloaded apps. A smartphone can be classified as a type of PC with a touchscreen interface, as well being a smart device.

A variety of options exist for typing on a smartphone. All of these phones will have the on-screen keyboard and can have predictive text enabled where you press one key, and the software predicts the word you want. A separate keyboard could be purchased that links a smartphone via a wired or wireless connection. Another option is a virtual keyboard that projects an image of a keyboard on a flat surface. Many phones run apps that convert your spoken word to text.

Messaging services allow users to send/receive text, pictures, and video links to/from other mobile phones. An alternative to sending and receiving messages via a plan from your mobile service provider is to use a mobile messaging app. Many messaging apps, such as iMessage, Facebook Messenger, or WhatsApp, provide group chat capabilities and can be downloaded to your mobile device at no cost.



Figure 2.12 – A Smartphone

Uses of a Smartphone

These include:

1. Making and receiving voice calls
2. Sending and receiving messages and emails
3. Video chat
4. Registering contacts
5. Taking photographs
6. Calculator, torch, alarm, etc. functions
7. Browsing the internet using a mobile browser
8. Playing games
9. Mobile payment for goods or services
10. Barcode scanning
11. Photography and video recording
12. Taking and searching notes

13. Showing map of user's location by GPS (Global Positioning System)
14. Providing a digital assistant (for example, Siri on iPhones), where you can ask questions to the phone, and it speaks responses back to you.
15. Connecting to external devices wirelessly, for example, wireless headphones via Bluetooth.

Most smartphones use three types of storage: internal RAM, a microSD card and cloud storage.

Smartphones And Social Media

Another common use of smartphones is accessing and interacting with social media platforms, anywhere and at any time. Social media platforms are online communication tools that enable people to interact with each other by sharing and consuming information. Figure 2.13 shows the names and logos of some of these platforms. With one click, users of social media can send messages, photos, and videos to one another, making long-distance relationships much easier to maintain. They can also stay up to date with the latest trends and topics simply by scrolling their newsfeed.



Figure 2.13 Some social media platforms

The most popular ten social networks worldwide as of January 2024 (ranked by number of monthly active users) are shown in Figure 2.14.

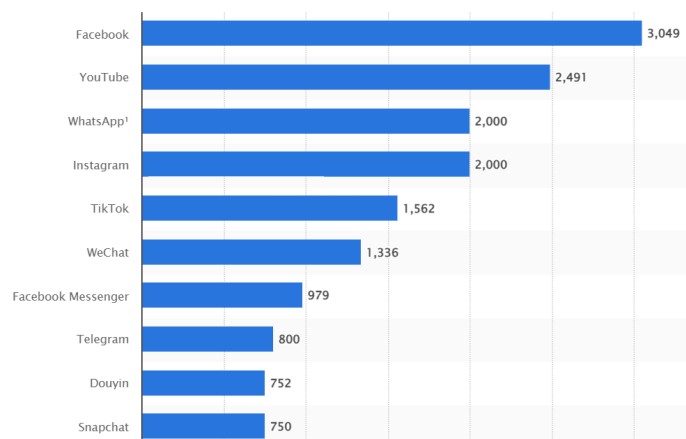


Figure 2.14 Number of monthly active users (Jan 24)

Facebook was the social media platform that was most often accessed through mobile devices in Ghana (also as of January 2024). This accounted for a share of roughly 28 percent. It was followed by YouTube and X (formally Twitter) with around 27 percent and 17 percent, respectively.

Smartphones have revolutionised social media for a number of reasons:

- More people have access to social media than ever before because of the rapid increase in ownership of smartphones over the past 17 years. As of the end of 2024, the number of smartphone users worldwide is predicted to reach 7.1 billion.
- There are now a huge number of social media apps available, each with its own specific purpose. This has given users more control over how they use and access their social media, as they can tailor their settings to suit their specific needs and interests. Most social media apps now have push notifications, which give alerts to any account activity so users can conveniently stay in touch with contacts in real-time.
- Smartphones enable users to access social media anywhere and anytime. They can check their Facebook feed while waiting in a queue in a shop or read X updates on their commute to work. They can capture photos, record videos, and share their thoughts without having to wait until they can access a desktop or laptop. This has enabled many to become more immersed in their social media networks as they can stay connected in real time.

All in all, the rise of the smartphone has completely transformed the way people interact and engage with social media. With the forecast of continued smartphone sales and the growth of different apps dedicated to social media usage, the popularity of this smartphone use will continue to grow.

Digital Cameras

A **digital camera** is a device that captures and stores digital images. People use digital cameras to take pictures of special events, vacations, and everyday life. It can also be used in taking digital videos.

A digital camera works in a similar way as a traditional camera. However, it captures the image on an electronic chip (such as a SD card, or a microSD card) rather than on film. The images are then usually stored in a removable memory card. Digital cameras are more convenient than film cameras, and since buying and developing film are not necessary, operating costs are lower. Also, captured digital images can be instantly checked on the monitor and, if necessary, retaken. Digital photographs are easy to retouch and manipulate through image-editing programs such as Photoshop. Many modern cameras have in-built Wi-Fi and/or Bluetooth, meaning you can connect them up to your smartphone/computer without cables or a media card reader. This allows for quick sharing of your images online via email or social media. A digital camera is an example of a digital device.

Many people nowadays use their smartphone for taking photographs and video, as they are light to carry, can take good quality photographs and videos, and are convenient for

quickly sharing images online. Digital cameras, however, give more flexibility when it comes to lenses and accessories. They often have sensors that are much larger than those found in smartphones and this often results in a higher resolution or better-quality image.

Digital cameras are often categorised into four groups: digital SLR (or DSLR), mirrorless, compact, bridge, and phone camera. Each type has advantages and disadvantages, and some types are more expensive than others. Only DSLRs and mirrorless models have interchangeable lenses.

The following summarises the pros and cons of the four types of digital camera.





	Pros	Cons
Compact 	<ul style="list-style-type: none"> • Small and compact so light and easy to carry • Inexpensive • Easy to control 	<ul style="list-style-type: none"> • Less control of the camera's manual functions • Lower quality photographs compared to other camera types • Slower to focus
Bridge 	<ul style="list-style-type: none"> • Great zoom for getting in close • Easy to learn on and you're able to control more of the manual features • No need for extra lenses 	<ul style="list-style-type: none"> • You can't change the lens • Doesn't work as well in low light (compared to a DSLR) • Harder to blur backgrounds
DSLR 	<ul style="list-style-type: none"> • Professional camera with great picture quality • You can have full control of the camera and its settings • You can change the lens 	<ul style="list-style-type: none"> • Heavy and big • You need to buy more lenses if you want more of a range
Mirrorless 	<ul style="list-style-type: none"> • Quieter shutter • More compact body so it's lighter and easier to carry • You can change the lens 	<ul style="list-style-type: none"> • Not as many lens options as a DSLR • Generally doesn't work as well in low light (compared to a DSLR)

Figure 2.15 Digital cameras

Wearable Devices

Wearable devices are electronic devices that are worn on the body. They can track a variety of data and can also be used to make payment and control smart home devices.

A wearable device is a small, mobile computing device designed to be worn and often communicate with another digital device using Bluetooth. Three popular types of wearable devices are **activity trackers**, **smartwatches**, and **smart glasses**, all of which can be classified as smart devices.

1. An activity tracker

This smart device focuses on health monitoring, tracking fitness-related activities such as distance walked, heart rate, pulse, calories consumed and sleep patterns. Some fitness trackers also offer additional features such as a built-in GPS. This wearable device

typically syncs, usually wirelessly, with an app on your computer or smartphone. They come predominantly in the form of wristbands. Examples include Fitbit and Garmin models.



Figure 2.16 Fitbit Charge 6

2. A Smartwatch

This smart device will also offer via an app health monitoring similar to a fitness tracker. But this is only one of its features. It will also tell the time and communicate wirelessly with a smartphone to enable you to make and answer phone calls, read and send messages, access the web, make mobile payments, play music, and work with other apps. The main smartwatch companies include Apple, Huawei, Samsung, and Garmin. The Apple Watch continues to be the global smartwatch market share leader. The next generation of smartwatches is likely to be even more powerful and feature-rich than the current crop of devices, with faster processors, more memory, and improved sensors. These watches will also probably run a wider range of apps and offer better integration with smartphones. AI in future smartwatches may also add new features such as interaction with a human fitness coach.



Figure 2.17 Apple Watch Series 11

3. Smart glasses

This smart device functions just like normal glasses, with the added ability to connect via Bluetooth or Wi-Fi to your smartphone or other devices. Smart glasses can stream audio, take photos and videos, and some even offer augmented reality features. The

wearer can view information or take photos and videos projected to a miniature screen in their field of vision.

Users control the device through voice commands or by touching controls on its frame. Some smart glasses also include mobile apps, such as fitness trackers. Ray-Ban Metas, Rokid Max, and Bose Frames Tempo are three examples of smart glasses.



Figure 2.18 Smart glasses with projected map and walking directions

4. Virtual reality (VR) and Augmented reality (AR) headsets

Virtual reality (VR) is an immersive experience that creates a computer-generated world around you. It is a world you can explore and interact with, like a video game, but it feels so real you can forget you are wearing a headset.

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. A VR headset is **a head-mounted digital device that provides a virtual reality environment for the wearer**. One area of use is entertainment. VR headsets, like the Oculus Rift or the PlayStation VR, instantly immerse gamers in other-worldly experiences.



Figure 2.19 Oculus Rift and PlayStation VR

Virtual Reality (VR) is not just about gaming. It is being used for many different applications such as in medicine for treating post-traumatic stress or phobias where VR is used to help patients face their fears in a controlled and supportive environment. It is being used also with 3D modelling to train surgeons across many areas of medicine

and remove the risk of practicing on real patients. VR can also be used in education. Examples include experiencing experiments or dissections that are difficult to perform in the classroom, going on virtual field trips for Geography or Biology, or visiting a museum or battle site for History.

Whereas with virtual reality, you are immersed in a completely virtual environment with no link to your real world, Augmented Reality (AR) is a technology that overlays digital features onto the real world. Using a camera and tracking technology, augmented reality shows you the real environment with computer-generated elements on top on your phone or on the screens of an AV headset (another example of a digital device).



Figure 2.20 AR is transforming the gaming industry

Some retail companies are making shopping more interactive and more accessible with augmented reality. Using AR technology, shops are letting their customers ‘try before they buy’. For example, the IKEA Place app lets you place virtual furniture in your house. Using a mobile phone and its camera, you can see what your room will look like with a scaled 3D model of the piece of furniture augmented on top. AR headsets, as shown in the example in Figure 2.18, are designed to overlay digital information, such as 3D graphics, text, or video, onto the user’s view of the real world. Smart glasses are sometimes used in AR applications. Compared to VR/AR headsets, smart glasses are usually thinner, more portable, and more ergonomic. However, they are generally less capable of rendering complicated environments and have less processing capacity.

The most important benefits of both virtual and augmented reality are immersive learning, realistic simulations for skill development, and increased engagement, making it a valuable tool for education, training, and experiential learning in various fields.

Uses of Wearable Devices

Along with those mentioned earlier, these include:

1. Wearable devices provide more insights into sports and fitness performance. Amateur and professional athletes from all over the world maximise their training regimes thanks to the biometric data captured through wearable technology such as the user's heart rate, speed etc. Wearable devices can be a key to unlock the potential of these athletes.
2. Wearable devices are used in the field of health. Patients who wear these smart devices can measure information ranging from body temperature to blood pressure, which is then relayed to their medical team in real-time. If something is flagged as a concern, doctors have a quicker way to accurately diagnose and treat the patient. This makes the entire treatment process quicker and more convenient.
3. Wearable devices transform the gaming experience. In the game app, Pokémon Go, your smartphone tracks your location, the camera films your surroundings, and the app overlays digital Pokémon on top for you to catch. When you are in the game, it looks like Pokémon are appearing right in front of your feet. The current version of Pokémon Go does not require an AR headset to play. However, the creators of Pokémon Go, have been working on an augmented-reality headset prototype called the Lightship Visual Positioning System. This wearable device aims to bring Pokémon Go characters to life by allowing game creators to paste characters and objects into your vision.

Game Devices

A game device or games console is a digital device whose main purpose is for playing virtual, or 'video' games on a screen.

Game consoles are designed for single-player or multiplayer games. Some connect to a television or a monitor (such as Xbox and PlayStation). Others (such as Nintendo Switch and Super Pocket) are handheld with the screens built into them. Game consoles today, like an Xbox, Nintendo Wii, or Sony PlayStation, are like purpose-built computers. They contain a processor, RAM, and a storage device, and they operate using an operating system, just like a computer.

Many consoles allow you to listen to music and to watch movies or view photos. Optical disk drives in the game consoles provide access to games and movies on CD/DVD. Game consoles that are internet capable enable gamers to download games, stream games, movies and audio, and play games with others online. Some gamers connect keyboards or webcams so that they can more easily send text messages or conduct video chats with other gamers.

As players interact with a video game on the game console, they direct movements and actions of on-screen objects via a controller, voice, or air gestures. Game controllers include gamepads, joysticks and wheels, dance pads, and a variety of motion-sensing controllers. These controllers will communicate via a wired or wireless connection.



Figure 2.21 Xbox Series X and PlayStation 5, two popular games consoles

Uses of a Popular Games Console (Ps5)

1. Stream or download and play games from The PlayStation Store.
2. Stream Movies and TV Shows: The PS5 has a long list of popular streaming services you can download from, including Netflix and Amazon Prime Video.
3. Play DVDs and Blu-ray Disks: The PS5 can read DVDs and high-quality Blu-ray disks. Note that PS5 does not support CDs. You could, however, transfer the files from CDs to a USB stick and use that instead.
4. Listen to Music: You can play music on your PS5 through online streaming services.
5. Browse the internet: The PS5 has an internet browser which you can use by changing to a few settings. However, this browser is rather limited; for example, it will not let you load multimedia.

As you can see, the PS5 is more than just a games console. The only thing stopping it from being a full-blown computer is its limited operating system. These statements are also true for some other games consoles.

Activity 2.6

In this activity, you will research the following smart devices using the internet: smartphones, digital cameras, and wearable devices. Summarise your findings based on key parameters such as their main purpose, typical users, design, portability, and cost. Then, present your findings in a PowerPoint presentation.

Instructions:

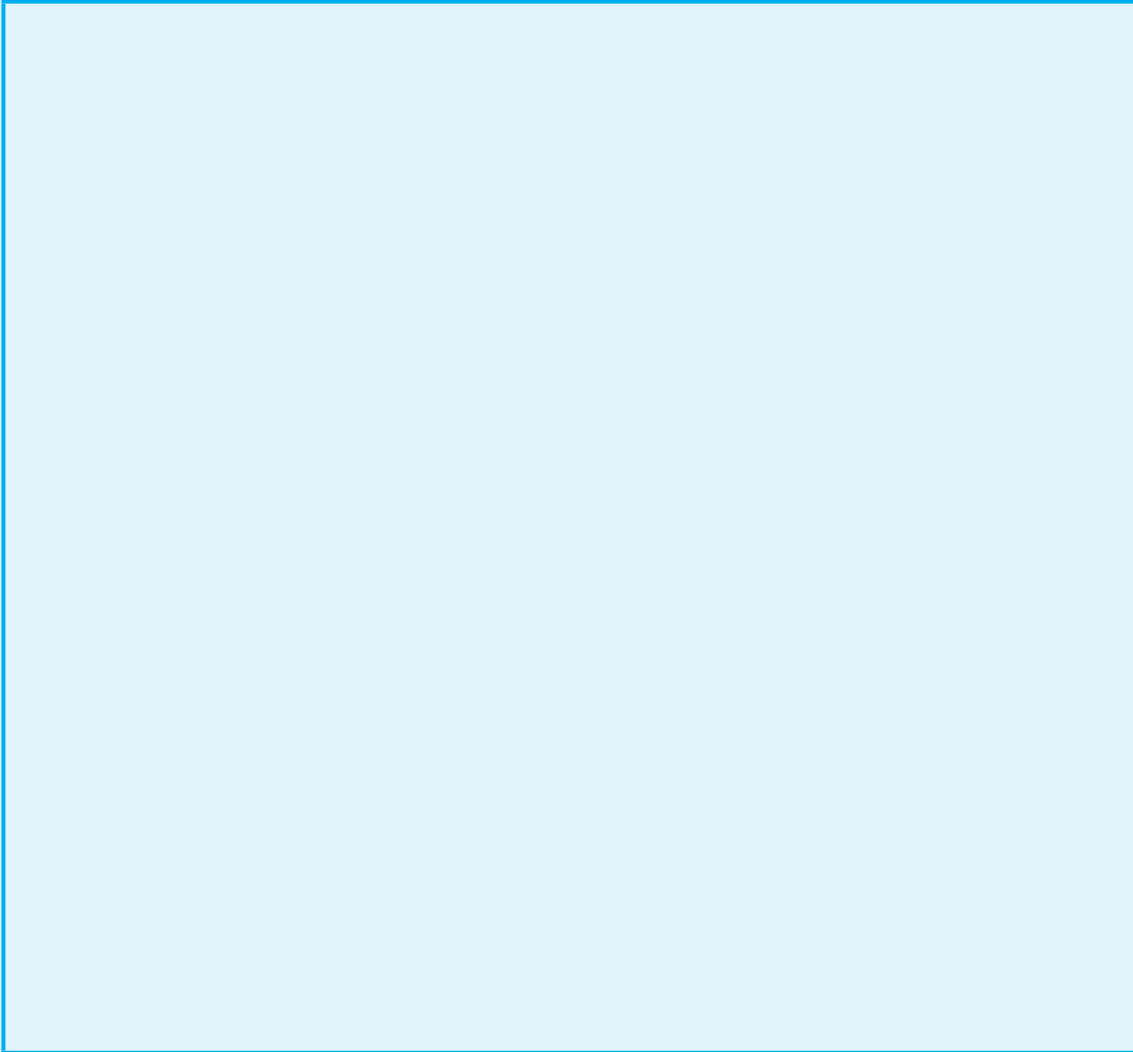
1. Open your web browser
 - a. Type `https://www.google.com` in the URL.
 - b. Search for **smartphones**, to establish the main purpose, typical users, design, portability, and cost of these devices.
2. Repeat step 1 for wearable devices and digital cameras.

3. Summarise your research finding using MS PowerPoint.
4. Add online videos to your presentation.

Note:

Your presentation, if possible, should include a live demonstration of the use of these devices.

Use the space below to reflect on Activity 2.6. How did you find the activity? Include any notes that will help you to complete the task in the future.

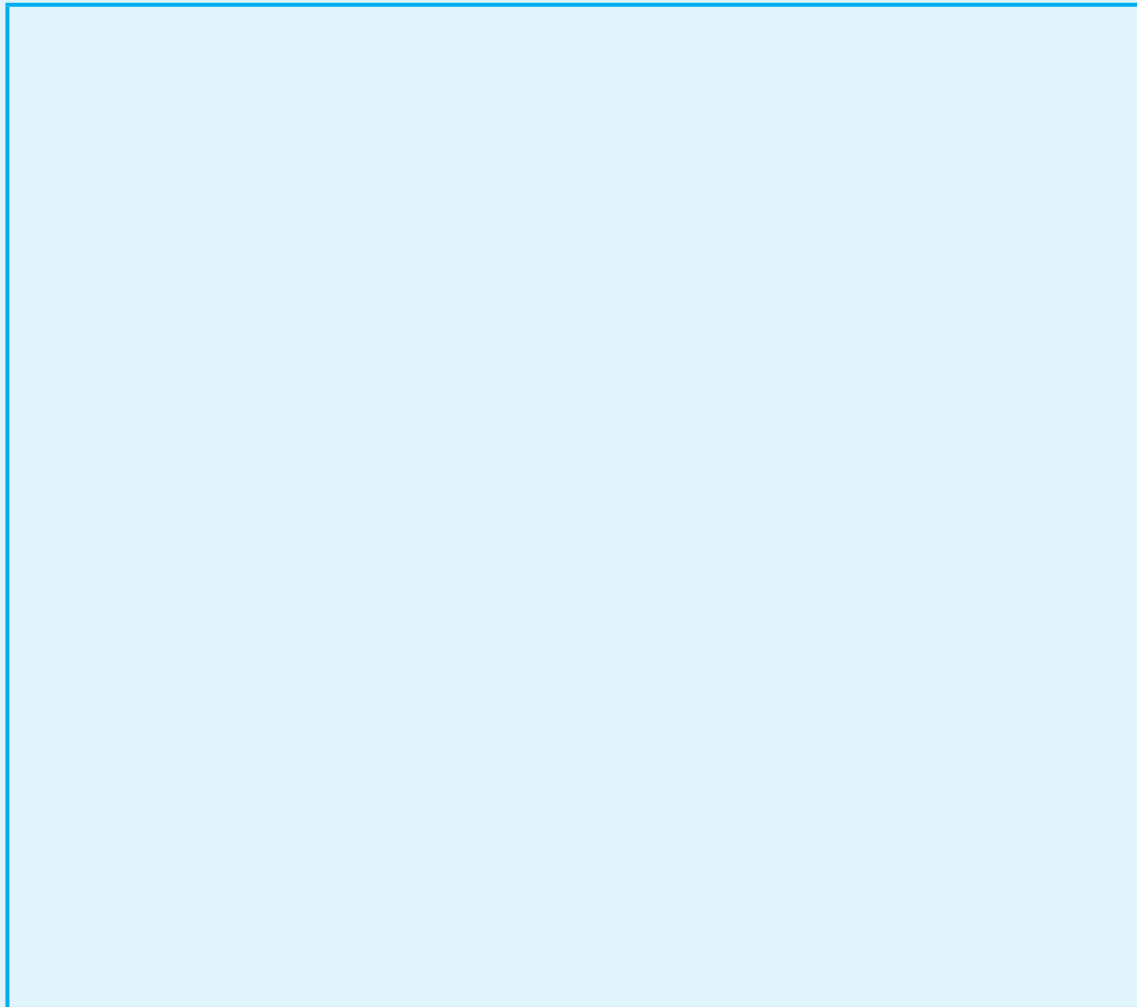
**Activity 2.7**

Now, we will shift our focus to gaming devices. Your teacher will assign you a specific device to research. In your presentation, include the device model and type, portability, functions, and cost. Your findings should be presented using a PowerPoint presentation featuring a recent advertisement for the device.

Instructions:

1. Open your web browser and go to Google (<https://www.google.com>)
2. Search for your assigned gaming device model, noting details such as its type, portability, functions, and cost.
3. Summarize your research findings in an MS PowerPoint presentation.
4. Include a recent advertisement for your device in the presentation.

Once you have seen all the group presentations, which games device do you prefer and why? Note your response below.



Let's now transfer our focus to the purpose and the uses of eBook readers, Smart devices, portable digital media players and the Internet of Things (IoT).

E-BOOK READERS

eBook readers, also called e-readers, are handheld portable smart devices that use software to display books, magazines, newspapers, and other text-based content on a screen. The main purpose of an eBook reader is to read digital books and periodicals. PCs, like desktops, laptops, tablets, and smartphones, can also be used to read eBooks by installing an eBook reader app, such as the Kindle app.

Amazon Kindle eBook readers are very popular and dominate the eBook reader market, but other companies like Kobo, Nook, and Onyx also make these devices. You can download reading material to these devices from online stores like Amazon, Apple, Barnes & Noble, and eBooks.com using a wireless or 4/5G connection. You can also download books to a PC or Mac and then transfer them to your e-reader using a USB cable.



Figure 2.22: Kindle Paperweight (11th edition)

Features of the Kindle Paperweight

- a. Touchscreen
- b. USB-C Charging port
- c. Adjustable screen light
- d. Dark Mode
- e. VoiceView screen reader over Bluetooth
- f. 16GB internal storage, with approx. 13GB available to the user
- g. Size: 6.9" x 4.9" x 3.2" (174.2 x 124.6 x 8.1 mm)
- h. Released 2022

One of the advantages of an e-reader is the ability to download free samples to see if you like a book before deciding to buy it. There are also many free classic books, which are out of copyright, available to add to your library at no cost. You can use the

dictionary feature to look up the meaning of a word while reading. Many e-readers also suggest books and provide synopses based on your previous book choices.

A popular model of an e-reader is the Kindle Paperwhite. At 30 minutes of reading per day, the battery is advertised to last for over a month. For more active readers, it will last at least 2–3 weeks.

Key Features and Benefits of an Ebook Reader

- a. Most models store at least 1,000 books.
- b. Screens allow you to read even in bright sunlight without glare.
- c. Some models include a built-in light for night-reading.
- d. Clear text and fonts, and a sharp display. Some allow you to customised fonts.
- e. Adjustable text size.
- f. Built-in Wi-fi and, in some cases, 4/5G connection.
- g. Long battery life.
- h. Page-turning function so you feel as if you are reading a real book.
- i. They do not heat up like a laptop.
- j. Books can be categorised or stored as collections.
- k. Readers can make notes and highlight pieces of text.
- l. Your own documents can be saved to your device.
- m. Screen can be rotated for better viewing of pictures, diagrams, maps, etc.
- n. Also able to read newspapers, magazines and web pages.
- o. In-built or on-screen keyboard enables searching within a book, a library or online.
- p. You can add your own annotations to the text.
- q. Dictionary feature.
- r. Automatic bookmark.

Portable Media Players

Digital media includes images, videos, and audio. A media player is a software or hardware device used to play digital media files. It can play these files from a storage device or stream them from the internet. Examples of media player software include Windows Media Player, VLC media player, and iTunes.

Smart TVs and game consoles are devices that can play audio or video material and display photos, but these notes will focus on the smart devices labeled as “digital media players,” also known as streaming boxes and streaming sticks. The purpose of these devices is to stream video and music content on your TV via an internet connection. Roku, Amazon, and Apple are three companies that produce both streaming boxes and streaming sticks.

These devices have RAM and a processor with an operating system that can run apps to access on-demand services like Netflix, Hulu, Disney+, and Spotify, as well as live

TV streaming through a user interface. The box or stick connects to your TV's HDMI port for video output and to a home Wi-Fi network to access the internet. A remote control is used to navigate and access the content.



Figure 2.23: Roku box and Apple TV box



Figure 2.24: Roku stick

Some models include voice controls through a digital assistant (e.g. Amazon Alexa with the Amazon Fire TV stick), as well as parental controls.

Both box and stick are small, light and portable, which means that they can be used to access a person's streaming content on any TV with an HDMI port. Because of size, a streaming stick is a little more portable. Streaming boxes tend to be more powerful with additional features but can be more expensive.

Activity 2.8

Having learned about eBook readers and portable media players, let's use the internet to research more on these devices. Research in a group and share your findings with the whole class.

Material needed: A smartphone, laptop, desktop or tablet with internet access.

Steps:

1. Launch an internet browser using any of the above devices. (Note: if you don't have your own advice you can look at using your school computer

lab or borrowing a device from your friends or your parents, make sure there is internet connectivity before launching the browser).

2. Type in the phrase eBook reader in the search bar and press the enter key.
3. Write down what you discover about an eBook reader, such as uses, manufacturers, costs.
4. Type in the phrase portable media player in the search bar and press the enter key.
5. Write down your findings.
6. Share your groups findings with the whole class.

WHAT MAKES A DIGITAL DEVICE SMART?

We use smart devices every day, but what exactly makes a digital device smart? A smart device is a wired or wireless digital device that can understand its surroundings, do tasks on its own, and connect to other devices for data exchange.

Context-aware means a smart device can gather information about its environment and adapt its behaviour. For example, cameras, microphones, and GPS receivers can provide important data to an AR headset to determine what you see on the screen.

Performing tasks autonomously means acting without direct commands from the user. For instance, smartphones can make suggestions based on the current weather without you having to ask.

Connectivity refers to a smart device's ability to connect to a data network. This network connectivity, whether wired or wireless, is crucial for a device to be part of the Internet of Things (IoT), which we will explore later.

Wireless Device Connections

Instead of connecting computers and mobile devices to other devices through ports and connectors, some devices use wireless communication technologies like Bluetooth, Wi-Fi, and Near Field Communication (NFC). Many of the digital devices we studied earlier in this section supported wireless connections.

Bluetooth

Bluetooth technology uses short-range radio signals to transmit data between two Bluetooth-enabled devices. Besides computers and mobile devices, many other devices like a mouse, keyboard, printer, headset, cars, and consumer electronics are also Bluetooth enabled. The range of a Bluetooth connection is about 10 meters, but this can vary depending on obstacles like people, metal, walls, or the electromagnetic environment. The range can be extended with additional equipment. If your computer

doesn't have Bluetooth, you can buy a Bluetooth wireless port adapter to convert a USB port into a Bluetooth port.

Wi-Fi

Wi-Fi (Wireless Fidelity) uses radio signals that follow 802.11 standards. Computers and devices with Wi-Fi capability can communicate with each other using these radio waves. Most computers, mobile devices, routers, and other communication devices are Wi-Fi enabled.

The strength and reach of your Wi-Fi signal depend on the manufacturer of your equipment and its power limitations, the location of your router, and any obstacles that might block the signal in your home or business. There are a range of different frequencies that Wi-Fi can work on, and each of them have different uses and ranges:

Frequency	Indoor Range	Outdoor Range
2.4GHz	Up to 45-50 meters (better penetration through walls and obstacles)	Up to 100-150 meters (depending on interference and line-of-sight)
5GHz	Up to 20-30 meters (weaker penetration through obstacles)	Up to 100-200 meters (better performance with clear line-of-sight)
6GHz	Up to 10-20 meters (limited penetration, suitable for smaller spaces)	Up to 200-500 meters (requires clear line-of-sight, more susceptible to interference)

NFC

NFC (Near Field Communication) uses close-range radio signals to transmit data between two NFC-enabled devices. Examples of NFC-enabled devices include many smartwatches, most smartphones, and some digital cameras, computers, and smart TVs. Other objects, like contactless debit and credit cards and contactless travel cards, also use NFC technology. For successful communication, the devices either need to touch or be within 4 centimeters of each other.

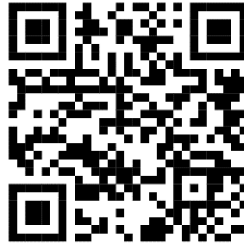


Figure 2.25: Bluetooth, Wi-Fi and NFC

Scan these QR codes for more information as described.



Uses of NFC Devices



Pairing Bluetooth Devices



Phone to a Wi-Fi Network

Activity 2.9

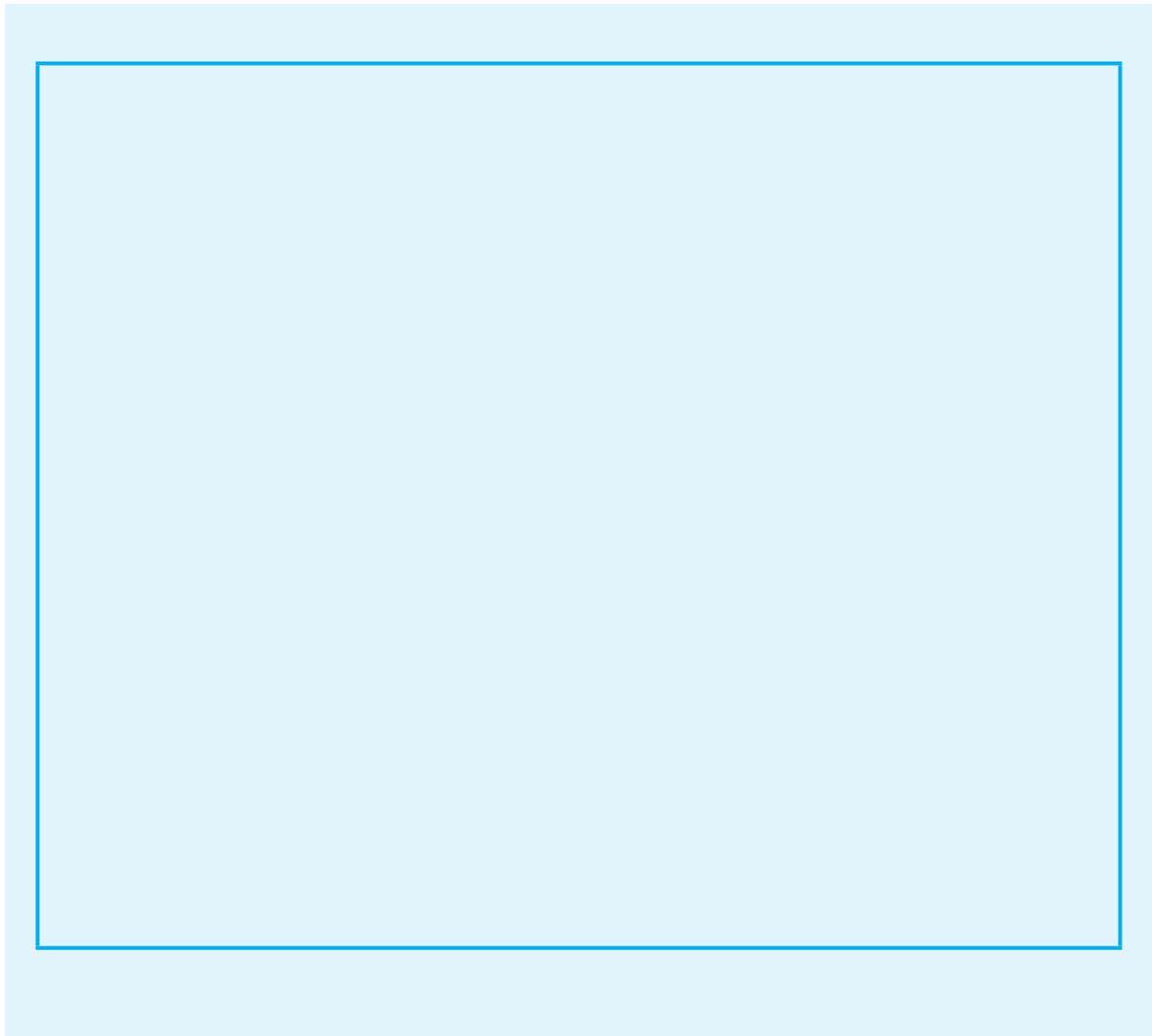
In this activity, you are going to read an eBook using an eBook reader and a tablet as well as a smart phone and a laptop. The relative pros and cons of each digital device should be discussed and documented in your group before sharing your findings with the whole class.

Note: This is a group activity, and it is going to be done in the classroom directed by your teacher.

Steps:

1. **Group A:** Read an eBook on a tablet and an eBook reader.
2. **Group B:** Read an eBook on a smartphone and a laptop.
3. Identify the pros and cons of each device.
4. Discuss the pros and cons of each device.
5. Prepare a short presentation (3-5 minutes) to share your findings with the whole class.

Use the space below to reflect on Activity 2.9. Which device do you prefer to use and why?



ADVANTAGES OF SMART DEVICES

The term ‘SMART’ in smart technology originally comes from an acronym for Self-Monitoring, Analysis, and Reporting Technology. Over time, it has come to mean technology that can talk to users, learn from their actions, and make choices based on the information it gathers. Smart devices have become a crucial part of many people’s lives, providing various benefits that improve their daily activities. These benefits include:

- 1. Enhanced Convenience and Efficiency:** Smart devices like smartphones and smart home appliances make life easier and more efficient. They help with tasks like setting alarms, making to-do lists, and managing schedules quickly. Voice-activated assistants like Siri or Alexa let you control these devices and get information just by speaking, saving time and effort.
- 2. Improved Connectivity:** Smart devices make the world more connected. They help you stay in touch with friends and family anywhere through social media,

video calls, and messaging apps. Smart home devices can also be controlled and monitored from afar, giving you peace of mind when you're away from home.

3. **Enhanced Health and Fitness Tracking:** Smart wearables like fitness trackers and smartwatches have changed how people monitor their health and fitness. These gadgets track steps, heart rate, and sleep patterns, and even give insights into overall health. By collecting and analysing this data, a person can make informed decisions to improve their well-being.
4. **Energy Efficiency:** Smart devices help save energy, which is important for the environment. For example, smart thermostats learn your temperature preferences and adjust settings to save energy. This reduces the carbon footprint of homes and saves money on utility bills.
5. **Entertainment On-Demand:** Smart devices bring entertainment to your fingertips. With streaming services like Netflix, Hulu, and Disney+, you can enjoy movies and TV shows whenever you want. Smart TVs and speakers let you control your entertainment through voice commands, making your downtime more enjoyable.
6. **Enhanced Home Security:** Home security has improved a lot with smart gadgets. Smart doorbells, surveillance cameras, and alarm systems offer remote monitoring and real-time alerts, giving peace of mind whether you're at home or away. You can keep a close eye on your property and loved ones, enhancing safety and security.
7. **Increased Productivity:** Smart devices are essential tools for professionals. They allow you to work remotely and stay organised. Tablets and smartphones come with applications for document editing, email management, and virtual meetings, helping you stay productive on the go.
8. **Customisation and Personalisation:** Many smart gadgets are designed to adapt to a person's preferences and needs. They learn your routines and adjust settings accordingly. This level of customisation ensures that your devices work in harmony with your lifestyle.
9. **Educational Opportunities:** Smart gadgets are powerful tools for learning and education. With access to online courses, eBooks, and educational apps, you can expand your knowledge in various subjects and skills at your own pace.

The Internet of Things (IoT)

The Internet of Things (IoT) connects digital devices over the internet and enables them to collect and exchange data. The connected devices can be activated using voice commands or be controlled by downloading and using an app or via a Bluetooth or Wi-Fi connection. The main steps involved in the working of IoT are:

1. The connected devices have embedded sensors that collect data.
2. The data collected by the sensors is then shared via the cloud and integrated with software.
3. The software then analyses and transmits the data to users via an app or website.

For example, a smart refrigerator can keep track of food, suggest recipes, and alert you about expiring items. A smart home security camera lets you monitor your home remotely and sends alerts to your smartphone.

Another example, in farming, the Internet of Things (IoT) can help by automatically checking soil moisture levels. This tells farmers when their crops need water. Instead of guessing and possibly watering too much or too little, farmers can give their crops just the right amount of water. Sensors measure soil moisture and provide the data to the farmer, who can then turn the irrigation system on or off as needed. With an IoT enabled system, the farmer doesn't need to be there. The system can automatically water the crops when the soil is too dry.

An extension: If the irrigation system gets weather information from the internet, it can know when it's going to rain and decide not to water the crops since the rain will do it.

A further extension: All the data about soil moisture, how much water the irrigation system uses, and how well the crops grow can be sent to supercomputers in the cloud. These supercomputers analyse the data to create models that predict future growing conditions and help prevent crop losses.

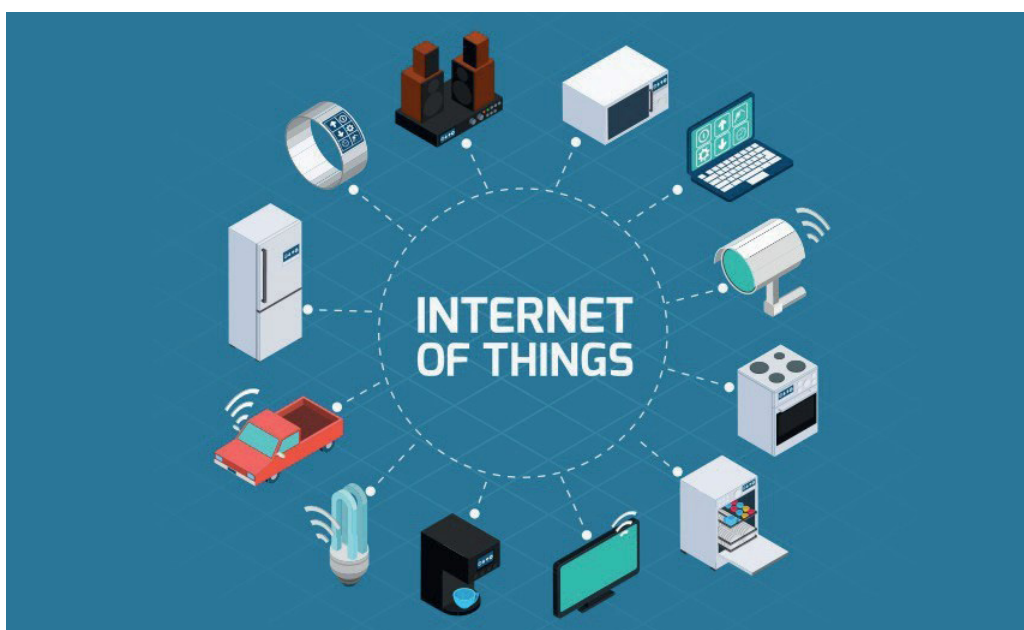


Figure 2.26: The Internet of Things

Notice a vehicle is included in the diagram in Figure 2.26. IoT devices can help fleet operators manage their IoT enabled vehicles by tracking fuel use, optimising routes, and scheduling maintenance, making everything more efficient and cheaper. IoT in vehicles can also monitor driver performance and health, such as detecting when a driver is tired and sending alerts.

As of April 2024, there are about 17.08 billion connected IoT devices worldwide. By 2025, it's estimated there will be more than 21 billion IoT devices. New technologies like AI, edge computing, 5G, and blockchain will help IoT devices keep growing quickly beyond 2025.

Activity 2.10

- a. Work together in groups or individually and match the correct image with its correct corresponding description of functions or uses below.

IMAGES OF DIGITAL DEVICES	DESCRIPTIONS OF FUNCTIONS OR USES
	<p>Plays music and videos. Portable and easy to carry. Can store a large number of audio and video files. Includes features like playlists, equalisers, and recording capabilities.</p>
	<p>Larger screen than a smartphone but equally portable. Used for browsing the internet, reading, playing games, and watching videos. Supports a variety of apps for productivity and entertainment.</p>
	<p>Used for reading digital books. Lightweight and portable. Adjustable font sizes for easy reading. Can store thousands of books. Includes built-in dictionary and note-taking features.</p>
	<p>Worn on the wrist. Tracks fitness and health metrics. Can receive notifications from a smartphone, such as messages and calls. Often includes features like GPS, heart rate monitoring, and music control.</p>
	<p>Used for capturing high-quality photos and videos. Offers more advanced photography features compared to smartphones, such as optical zoom, various shooting modes, and manual settings.</p>
	<p>Portable computer that allows you to browse the internet, create documents, watch videos, play games, video conferencing, programming and store files.</p>

- b. Discuss within your groups why the digital devices are suited for the given uses and suggest possible alternative devices. Prepare a short presentation (3-5 minutes) to share your outcomes with the whole class.

Activity 2.11

In this activity, we are going to think of a scenario where alternative digital devices could be employed, and we will select which digital device would be best and explain our reasons.

Note: This is a group activity and is going to be done in the classroom or the ICT Laboratory instructed by your teacher.

Steps:

1. Group A: Taking notes and reading textbooks.
Group B: Video calling and messaging.
3. Choose two digital devices that could be used. (e.g. laptop and tablet, smartphone and smartwatch).
4. Search for the pros and cons of the two devices through the internet and discuss.
5. Create a document summarising your reasonings for the selection of your digital device.

Activity 2.12

In this activity, we are going to create a mind map for the following:

- a. Application of the Internet of Things.
- b. The efficiency and convenience of smart devices in the home.
 - i. Application of the Internet of Things.

Materials needed: Large sheet of paper or a whiteboard, Markers (in different colours), Pens or Pencils (in different colours).

Steps:

1. Write “Application of the Internet of Things (IoT)” in the center of your paper or whiteboard and draw a circle around it.
2. Identify the major categories of IoT applications (e.g. healthcare, Agriculture etc.).
3. Draw branches from the central node and label each branch with a category name and examples.
4. Add additional details or features to each specific examples or sub-categories. Use smaller branches to elaborate on how each application works or its benefits.

5. Review your mind map to ensure all relevant applications and details are included.
6. Refine the map for clarity and organisation.
 - ii. The efficiency and convenience of smart devices in the home.

Note: Refer to the steps in 5A to create the mind map for 5B.

Activity 2.13

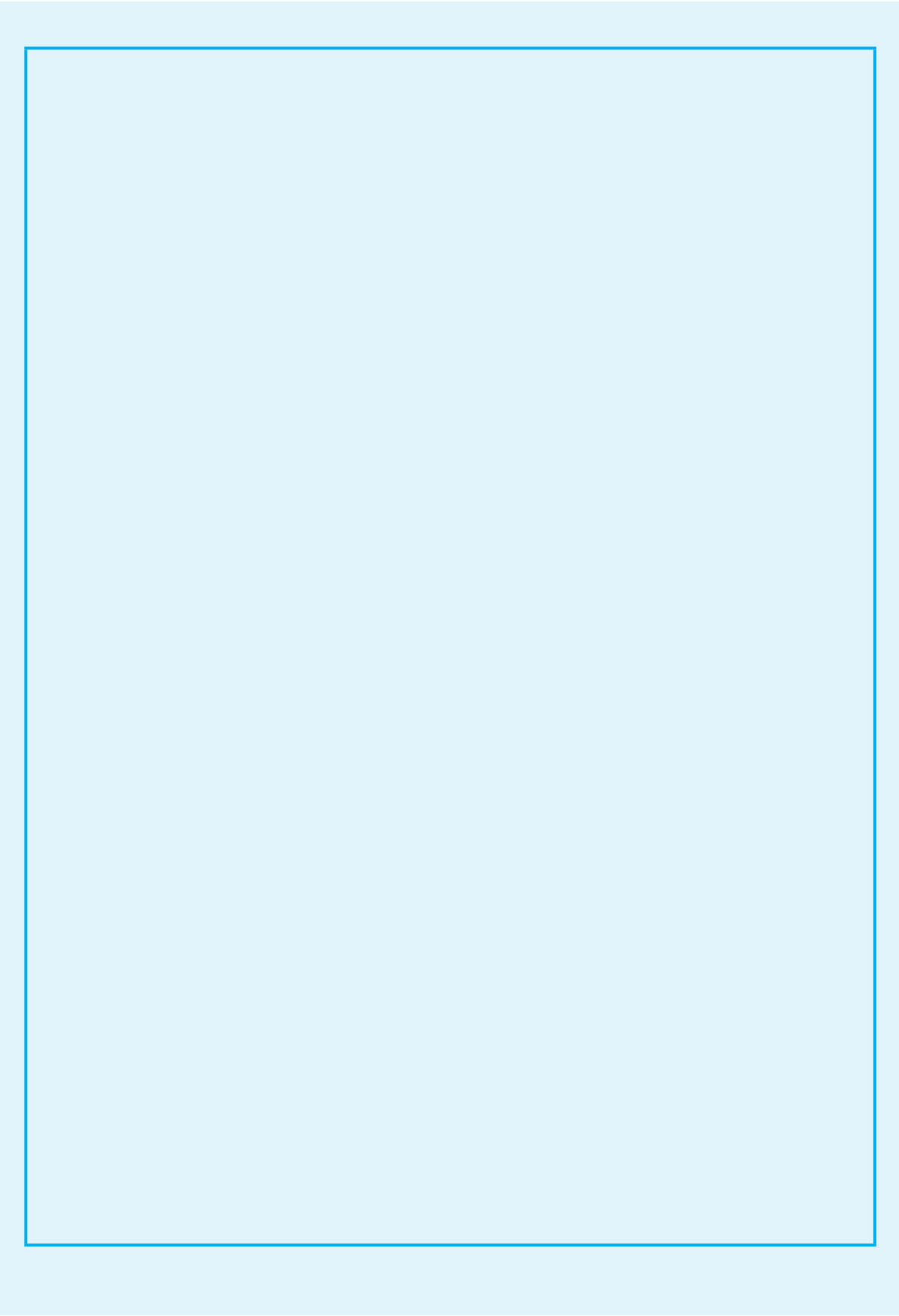
In this activity, you are going to create a concept map for digital devices covered in this section. Let's try it.

Materials needed: A large sheet of paper or a whiteboard, Markers (in different colours), Pens or Pencils (in different colours).

Steps:

1. Make a list of digital devices covered in the course.
2. Identify major uses of these digital devices (e.g. voice call, messaging, tracking, etc).
3. Write the phrase 'Digital Devices' in the center of your large paper or whiteboard and draw a circle around it. This is your central node.
4. Draw branches from the central node and label each branch with a name of a digital device.
5. For each category, add specific devices.
6. Draw smaller branches from each category node and label them with the names of the devices.
7. Review your concept map to ensure all relevant devices and uses are included.
8. Refine the map for clarity, ensuring labels are clear and branches are well-organised.
9. Submit your work to your class teacher for a whole class discussion.

Use the space below to reflect on Activities **2.10**, **2.11**, **2.12** and **2.13**. How did you find the activities? Include any notes that will help you to complete the tasks in the future.



REVIEW QUESTIONS

1. How can digital learning impact teaching in a Senior High School?
2. Is digital learning more suited to the teaching and learning of certain subjects? If so, which subjects and how?
3. How has the reliance on digital devices impacted on the following sectors of our society? State two impacts for each.
 - a. Agriculture
 - b. Business
 - c. Aviation
 - d. health

4. Create a concept map on the possible benefits of digital technology in education.
5. Why would you recommend a digital thermometer over an analogue one to a doctor who wants to take the temperature of a patient?

6. Your brother or sister is a freelance journalist and is always on the move going from one place to another, gathering news and digitising it for presentation. One day he/she asked for advice with respect to which computer to use. Suggest a computer for him/her with reasons.

7. Your school has only one modern computer that can run the word processing application (MS Word 2019) and one printer located in the ICT lab.

All the other departments, including the school administration rely on the same computer and only printer for typing and printing of hard copies of their documents. The computers in these departments have a low processing power, hence cannot efficiently run word processor software and other applications.

As a result, there is always congestion at the ICT lab due to competition for document typing and printing. This impacts on the ability of the ICT coordinator to concentrate on their work.

With your knowledge of types of computers, what roles can server and desktop (client) computers play to ease the pressure on the PC and the ICT coordinator at the school's computer lab?

8. Thelma is an IT technician who regularly has to travel to different buildings to fix computers. She needs to log the repairs she makes while she is out of the office. What type of digital device should she use? Justify your choice of device.
9. **Project Work:** Design a full desktop computer system specification tailored to meet the needs of a graphics designer considering both performance and aesthetics. Your specification list should include a suitable list of peripheral devices.
10. Give three examples of using a smartphone and a digital camera for taking digital photos.

Smartphone Advantages	Digital Camera Advantages

In what situation is a smartphone the best choice of device to use?

In what situation is a digital camera the best choice of device to use?

11. Describe two possible uses of a games console other than playing video games.
12. Outline the set of steps required to connect wireless headphones to a smartphone.
13. How does a traditional camera differ from a digital camera?
14. How do the features and functionalities of an eBook reader improve the overall reading experience compared to traditional printed books?
15. In what ways do digital media players enhance the way we consume and interact with media compared to traditional media playback devices? Provide answer in a simple sentence
16. Complete the following sentence:
S..... d..... contain sensors, processors, and software that enable data collection, data analysis, and decisions based on this analysis.
17. Explain when and why an eBook reader needs to be connected to the internet.
18. Smart devices are intended to automate tasks and provide real-time data and feedback to users, making their lives easier and more convenient. Explain how this automation is achieved.
19. Describe two advantages of using a tablet for reading eBooks compared to using an eBook reader.
20. Assess the security risks associated with smart devices.
21. A phablet is an example of a smart device. Create a short report describing what is meant by a phablet compared to a tablet.
22. eBook readers are a powerful resource in schools. Give pros and cons of this opinion.
23. Predict the future trends in smart technology and how they might revolutionise lifestyles in the next decade.
24. Develop a strategy for securing IoT devices from potential cybersecurity threats in a smarthome environment.
25. Research what is meant by blockchain technology and how it could revolutionize data security and privacy in future smart devices.

ANSWERS TO THE REVIEW QUESTIONS

1. Digital learning can enhance high school teaching by providing interactive, personalised, and accessible educational resources for students.
2. Yes, digital learning is more suited to subjects like computer science and mathematics, as it provides interactive tools and simulations that enhance understanding.
3.
 - a. **Agriculture:** Digital devices have improved crop monitoring and yield predictions and enabled precision farming techniques.
 - b. **Business:** They have enhanced communication and streamlined operations through automation.
 - c. **Aviation:** Digital devices have increased flight safety with advanced navigation systems and improved efficiency with automated processes.
 - d. **Health:** They have enabled telemedicine services and improved patient record management with electronic health records.
4. Here's a simple concept map outlining the possible benefits of digital technology in education:
5. A digital thermometer is recommended because it provides faster, more accurate readings and is easier to use than an analogue one.
6. A laptop, tablet or mobile/smartphone is recommended.

Reasons:

Because, as a freelance journalist, he/she is always on the move and so require a portable computer. Laptops computers are smaller and lighter than desktops and can easily be moved around. They can also be used without been connected to a mains source of electrical power (AC). Even smaller, lighter and easier to move, compared to a laptop is a tablet PC, which also have their own battery and can be used without needing access to mains power. Another option is a mobile/smartphone. Among the three options, a smartphone or mobile phone offers the best in terms of lightness, mobility, and mains power independence.

7. The server PC could be placed at the computer lab and networked with those with low processing powers in the other departments of the school. In this way, the low processing capacity PCs (the desktops or client PCs)) found in the other departments can share the high processing power, applications, and the only printer from the powerful computer (server) in the lab. It would also share the printer with the desktops (client PCs) at the various other departments so that they can print remotely from the various offices without coming to queue at the computer lab.

Note: In the absence of a specially designed server PC, the modern computer with high processing power located in the computer lab can be used as a server.

8. Each of these devices is recommended for Thema due to the nature of the job: Tablet, smartphone, PDA. The reason is that, either of the afore-mentioned devices are light in weight and so are easily portable. Also, each of them has internal source of power supply (battery), and so can run independent of mains power.
9. Your teacher will provide you feedback on your project.
10. Expected Answers:

Advantages of Smartphones

- Convenience
- Portability
- Simplicity
- Sharing

Advantages of Dedicated Cameras

- Image quality
- Interchangeable lenses
- Manual controls
- Comfortable handling and precise control
- So, which one to use?
- For casual photos and sharing, smartphone is the best
- For serious photography or professional needs, a dedicated camera offers a good control and quality.

11. Possible uses include:

Entertainment Hub: Modern games consoles are designed to be all-encompassing entertainment centers.

Streaming Services: Consoles like the PlayStation and Xbox allow you to download apps for popular streaming services like Netflix.

Media Player: Games consoles can also double as media players for your personal collection of movies, music, and photos.

12. Steps:

- Prepare the headphones: Power on.
- Access Bluetooth settings on your smartphone.
- Enable Bluetooth and search for devices: Turn on Bluetooth
- Select your headphones from the list: Tap to connect
- Confirmation and connection: Pairing code
- Confirm connection successful.

- 13.

- Traditional cameras use film while Digital cameras use an electronic image sensor.
 - Reviewing images: With traditional cameras, you can't see the photos you have taken until after the film is processed. Digital cameras allow you to see the image on the screen right after you take it, letting you review, and retake photos as needed.
 - Image editing: Digital photos can be easily edited on a computer, whereas editing film photos requires special techniques and equipment.
 - Cost: Traditional photography involves the cost of film and processing, while digital photography is generally cheaper in the long run (though some high-end digital cameras can be very expensive).
 - Learning curve: Digital cameras are generally easier to use for beginners, as they provide immediate feedback and allow for easy retakes. Traditional cameras may require a bit more understanding of exposure and film types to get good results.
 - Image quality: Both film and digital cameras can produce high-quality images. Film photography can offer a unique aesthetic with smoother colour transitions and potentially higher dynamic range. Digital photography offers superior low-light performance and constantly improving resolution.
14. The features and functionalities of an eBook reader, such as adjustable font sizes, backlighting, portability, and extensive storage, improve the overall reading experience by offering greater convenience, accessibility, and customisation compared to traditional printed books.
 15. Digital media players enhance media consumption and interaction by offering features like on-demand access, streaming capabilities, user-friendly interfaces, and the ability to store and manage large libraries of digital content, providing greater flexibility and convenience than traditional media playback devices.
 16. Smart devices
 17. An eBook reader needs to be connected to the internet to download new books and sync reading progress across devices.
 18. Smart devices achieve automation by using sensors to detect changes or inputs, and then using pre-programmed algorithms to automatically perform tasks or provide feedback to users in real-time.
 19. Using a tablet for reading eBooks offers advantages such as vibrant colour display for content-rich books and the ability to install multiple reading apps for a diverse library experience.
 20. Smart devices pose security risks due to potential vulnerabilities in their software, which can be exploited by hackers to gain unauthorised access or control.

21. A phablet is a hybrid device that combines features of a smartphone and a tablet, typically having a larger screen size (usually between 5.5 to 7 inches) than traditional smartphones but smaller than standard tablets, providing a balance between portability and functionality.
22. **Pros:** eBook readers can lighten backpacks by holding multiple textbooks and allow learners to access a wide range of reading materials instantly.
Cons: They may cause distractions if used for purposes other than reading and could pose a risk of eye strain from prolonged screen use.
23. Future trends in smart technology are likely to include enhanced artificial intelligence integration, widespread adoption of smart home automation, and advancements in wearable health monitoring devices, all of which will significantly streamline daily tasks and improve overall quality of life.
24. A strategy for securing IoT devices in a smart home environment includes regularly updating device firmware, using strong and unique passwords, implementing a secure home network with encryption, and employing a dedicated IoT security management system.
25. Blockchain technology is a decentralised system that enhances data security and privacy for smart devices by distributing data across multiple nodes, making it difficult for attackers to breach. This decentralised nature reduces vulnerabilities, ensures data integrity through cryptographic hashing, and allows for enhanced user control over data access and sharing. Blockchain can also provide secure authentication and prevent unauthorised access or tampering with data.

EXTENDED READING

- How has Technology Made Our Lives Easier <https://www.youtube.com/watch?v=ZDzjqmU43Vw>
- Benefits of Using Technology in Education <https://www.youtube.com/watch?v=oDAkGCsTsyA>
- <https://www.twinkl.co.uk/teaching-wiki/ict-information-and-communication-technology>
- <https://www.khanacademy.org/computing/intro-to-python-fundamentals>
- <https://saferinternet.org.uk/guide-and-resource/young-people/resources>
- Scratch as an educational resource (([Scratch - Imagine, Program, Share \(mit.edu\)](#)))
- Types of Computers: <https://opentextbc.ca/computerstudies/chapter/types-of-computers/>
- Questions and Answers: <https://testbook.com/question-answer/desktop-computers-laptop-computers-tablets-and-s--5d691478fdb8bb069bf5ba9a>
- Ten main uses of smartphones: What Are The 10 Main Uses Of Smartphones? | by Canadian Cell Parts | Medium
- How to use a digital camera: How to use a digital camera | Centre for Data Digitisation and Analysis (qub.ac.uk)
- Wearable devices: What Is Wearable Technology? Examples of Wearables | Built In
- History of video game consoles: IST110_Final_Report.pdf (bpb-us-e1.wpmucdn.com)
- <https://www.techtarget.com/iotagenda/post/Using-blockchain-to-improve-security-for-IoT-devices>.

REFERENCES

1. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. New York: Wiley.
2. Rajaraman, V. (2018). Introduction to Information Technology. PHI Learning Pvt. Ltd
3. Vermaat, M., E., Sebok, S., L., & Freund, S., M. (2014). Discovering Computers: Technology in a World of Computers, Mobile Devices, and the Internet, Course Technology, Cengage Learning
4. Philo, A. and Angstadt, M. (2020). Microsoft Word 2016 Step-By-Step Guide. A MC-NPL Computer Lab Lesson Plan.
5. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. New York: Wiley.
6. Rajaraman, V. (2018). Introduction to Information Technology. PHI Learning Pvt. Ltd
7. Vermaat, M., E., Sebok, S., L., & Freund, S., M. (2014). Discovering Computers: Technology in a World of Computers, Mobile Devices, and the Internet, Course Technology, Cengage Learning
8. Philo, A. and Angstadt, M. (2020). Microsoft Word 2016 Step-By-Step Guide. A MC-NPL Computer Lab Lesson Plan
9. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. New York: Wiley.
10. Rajaraman, V. (2018). Introduction to Information Technology. PHI Learning Pvt. Ltd

11. Vermaat, M., E., Sebok, S., L., & Freund, S., M. (2014). *Discovering Computers: Technology in a World of Computers, Mobile Devices, and the Internet*, Course Technology, Cengage Learning
12. Philo, A. and Angstadt, M. (2020). *Microsoft Word 2016 Step-By-Step Guide*. A MC-NPL Computer Lab Lesson Plan
13. O' Leary, T. J., & O' Leary L. I. (2017). *Computing Essentials*, 26th edition. New York: Mcgraw Hill.
14. Wempen, F. (2014). *Computing Fundamentals: Introduction to Computers*. New York: Wiley.
15. Rajaraman, V. (2018). *Introduction to Information Technology*. PHI Learning Pvt. Ltd.
16. Vermaat, M., E., Sebok, S., L., & Freund, S., M. (2014). *Discovering Computers: Technology in a World of Computers, Mobile Devices, and the Internet*, Course Technology, Cengage Learning.

Acknowledgements



Ghana Education
Service (GES)



List of Contributors

Name	Institution
Felix Tenkorang Opare	Accra Academy
Kwadjo Adjei	SDA SHS Asokore Koforidua
Solomon Nam Padam	Kadjebi Asato SHS
Abdul Rahim Mahmud	Yeji SHS