Computing

GCSE Computer Science – Memory and Data Representation

Assessment Opportunities	Literacy/Reading opportunities	CEIAG Links
Within every half term, there will be a minimum of 2 low stakes quizzes. These will be automatically marked out of 20. **There will also be a end of unit test which will be based on past exam questions. These questions are then marked and gone through as a class.**	Units - Units and data representation - OCR - GCSE Computer Science Revision - OCR - BBC Bitesize Computer Science OCR GCSE (9-1) - Data Representation (google.com) GCSE OCR Computer Science: Data Representation Flashcards | Quizlet	• Penetration tester • Application analyst • Applications developer • Cyber security analyst • Data analyst • Forensic computer analyst • IT trainer • Machine learning engineer

Curriculum vision:

"Our aim is to deliver a curriculum that is inclusive, relevant and progressive for all learners."

Sub topic 1.2.1 – Primary storage (Memory): Lesson 1

FIRST ASSESSMENT SUMMER 2022

The big picture

Why is this relevant for the students?

- What does a computer system consist of?
- What is memory is and why would a computer system need this?
- How does their body relate to a computer system?
- Does a bigger brain mean you can process more information?

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning.

Objectives

What should the students be confident/able to do at the end of the session?

1. List the two main forms of memory.
2. Discuss the need for ROM and RAM.
3. Explain the difference between ROM and RAM.
4. Discuss the impact of the amount of RAM on performance.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

What will make the students want to learn?

1. How many computer systems do students use every day?
2. What can they remember? Can they remember things clearer from today or from when they were born? Why? Earliest memory
3. Can they memorise some items you show them?
4. Are you a computer? How does your memory and brain relate to a computer system?

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

Expected progress

- Explain what RAM and ROM are.

Expected progress: This is likely to be activities and Learning tasks that meet your expectations for the class progress towards the objectives.

Good progress

- Explain what RAM and ROM are used for, using some of the keywords.

Good progress: This would show a development from basic understanding and be indicative that some students use stretch and challenge material during the lesson.

Exceptional progress

- Can create a detailed visualisation of how RAM and ROM work using all of the keywords.
- Can explain how RAM uses addresses.

Exceptional progress: This would indicate the level of progress if all extension activities have been completed and at 8/9 levels of understanding.

The sticking points

What do I want students to remember?

- RAM is used for short term storage
- RAM is volatile and is 'cleared' or 'wiped' every time power is turned off
- RAM is often between 8GB and 16GB on a Desktop Computer
- ROM is permanent and keeps its memory
- ROM is usually found in smaller quantities

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Notes

Keywords

What exam/specification specific words should the students be confident with and need to know?

- Primary storage – Memory used in Von Neumann architecture
- CPU – Central Processing Unit
- RAM – Random Access Memory
- Volatile – Gets emptied when the power is turned off
- ROM – Read Only Memory
- Non volatile - Doesn't lose the data when the device is turned off
- BIOS – Basic input/output system contains programs to load the hardware
- Firmware – Permanent software programmed into ROM
- Disk thrashing - when a computer's virtual memory subsystem is in a constant state of paging

Multiple Choice Questions will assess these keywords; use the MCQs supplied.
You may wish to customise these as needed.

Differentiation

How will I enable access to each area of learning?

- Think pair share – Peer support
- Activity 1 - group work
- Activity 2 – choice, handout from Activity 1

Notes: *Use of stretch and peer assessment task ideas supplied may support high end differentiation.*
You will need to modify the resources to meet the needs of your students specifically. You may wish to refer to Departmental or School policies on differentiation methods used within your centre.

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

- Research task - group work – find out what the key terms mean using the mind map template.
- Check understanding – AFL true or false PowerPoint.
- EBI - What is ROM? How is it different to RAM? Are there different types of RAM (What is SRAM/DRAM).
- Can they find out about all key words?

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students demonstrate their knowledge by one of these activities:

- create a simple animation to explain how RAM works
- draw an illustration to explain how RAM works
- assessment – peer review against success criteria.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 3/Extension

What tasks will I ask the students to complete to develop their understanding during the lesson?

This is optional depending on length of lesson:

- Thinking time.
- I love my new gaming computer. It is running slow. Can you help?
- Discuss and add details to Activity 2 outcome.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Summary/Plenary

How will I check that students have retained the knowledge?

- Kahoot quiz

Notes: *Use the MCQs to check basic understanding of Keywords and Topics.*

Use the level of response (LOR) to develop deeper knowledge and allow Peer Assessment and Review. This can be developed to use the LOR ideas as homework etc.

Homework/flipped learning

Subtopic 1.2.1 – Primary storage (Memory): Lesson 2

The big picture

Why is this relevant for the students?

- What is memory?
- What happens if there isn't enough RAM?
- Why could my games be running slowly?

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning.

Objectives

What should the students be confident/able to do at the end of the session?

1. Recap on RAM and ROM (embedding).
2. Explain what virtual memory is.
3. Explain the advantages and disadvantages of virtual memory.
4. Understand what flash memory is.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

What will make the students want to learn?

1. Thunk – thinking as students enter classroom
2. Rally coach: coach thinks of a problem with their computer and the coachee has to guess, using guidance from the coach.
3. Video to recap.
4. Kinaesthetic task.
5. 'Who am I' plenary.

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

Expected progress

- Explain what virtual memory and flash memory are.

Expected progress: This is likely to be activities and Learning tasks that meet your expectations for the class progress towards the objectives.

Good progress

- Explain how a lack of RAM can affect performance, discussing virtual memory use and disadvantages.
- Give a range of examples of flash memory.

Good progress: This would show a development from basic understanding and be indicative that some students use stretch and challenge material during the lesson.

Exceptional progress

- Detailed discussion on virtual memory including disk thrashing, paging/swapping, fragmented memory addressing issues.
- EBI - Research the electronic differences between Flash memory and RAM.

Exceptional progress: This would indicate the level of progress if all extension activities have been completed and at 8/9 levels of understanding.

The sticking points

What do I want students to remember?

- What is virtual memory
- Why it is needed
- Why it is different to RAM
- Where virtual memory is located
- What flash memory is
- How flash memory is different to RAM
- Examples of flash memory

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

- Flash memory
- Hard disk - Magnetic storage device (non volatile, holds all of your files and programs)
- Disk thrashing/Swapping
- Page file – A
- Portable - can take it with you
- Internal - inside
- External - outside
- Secondary storage – hardware which stores data other than RAM and ROM

Multiple Choice Questions will assess these keywords; use the MCQs supplied.

You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning for my students?

- Peer work – rally coach.
- Class activity, allocation of roles.
- Printed plenary given to support lower achieving students.
- Challenge stretch questions and research for keywords to push high end ability.

Notes*: Use of stretch and peer assessment task ideas supplied may support high end differentiation.*
You will need to modify the resources to meet the needs of your students specifically. You may wish to refer to Departmental or School policies on differentiation methods used within your centre.

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

- Activity A - Fetch the first instruction (secondary storage)
- Slow, performance of the bus/magnetic drive etc
- Activity B - Fetch the instruction from RAM
- Issues with insufficient RAM, Swapping out etc
- Activity C - RAM is full - Use virtual memory
- Virtual memory - pros and cons,

(Further possibilities - cache - outside of specification)

Notes*: Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs. Reference the Common misconceptions/FAQ guide to support your delivery of the topic.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

- Exam questions – download from the OCR subject webpage/Interchange/ExamBuilder
- Use Exams questions from current specification.

Notes*: Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*

Reference the Common misconceptions/FAQ guide to support your delivery of the topic.

Activity 3/Extension

Potential extension

The future: Using the MCQ, inspire students to find out how memory has changed over the years and how current electronic components may restrict further growth. Students can look at the research and development from Intel and other industry leaders.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*

Reference the Common misconceptions/FAQ guide to support your delivery of the topic.

Summary/Plenary

How will I check that students have retained the knowledge?

- Who am I?
  Use the resource provide as a class activity and then in pairs ask pupils to create a 'Who am I?' for their partner. Higher ability should be given the more difficult concepts (virtual/paging/swapping or cache/addressing) and include higher ability keywords.

Notes: *Use the MCQs to check basic understanding of Keywords and Topics.*

Use the Level of response (LOR) to develop deeper knowledge and allow Peer Assessment and Review. This can be developed to use the LOR ideas as homework etc

Homework/flipped learning

Subtopic 1.2.2 – Secondary storage: Lesson 1 – Storage devices

The big picture

Why is this relevant for the students?

1. Ask students to identify what they store on their computers, tablets, phones etc. Write these on a whiteboard.
2. Discuss the need for storage devices – what would they do without them? What use would computers be without storage?

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning

Objectives

What should the students be confident/able to do at the end of the session?

1. Understand the need for secondary storage.
2. Understand the common types of storage device.
3. Understand the common characteristics of different types of storage device.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

How will I encourage engagement?

1. Ask students to identify all the different storage devices that they use. This can be a game of hangman (or similar), with students working in pairs or as a class, using the names of common storage devices.

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

Expected progress

- Define the term secondary storage.
- Name the common types of storage.
- Match most devices correctly to the type of storage
- Identify some characteristics of different types of storage.

Expected progress: This is likely to be activities and Learning tasks that meet your expectations for the class progress towards the objectives.

Good progress

- Describe the need for secondary storage.
- Match devices to their type of storage.
- Describe the characteristics of each type of storage

Good progress: This would show a development from basic understanding and be indicative that some students use stretch and challenge material during the lesson.

Exceptional progress

- Explain how each type of storage device works.
- Compare the use of different types of storage media.

Exceptional progress: This would indicate the level of progress if all extension activities have been completed and at 8/9 levels of understanding.

The sticking points

What activities will the students undertake?

- Definition of secondary storage.
- Common types of storage (optical, magnetic, solid state).

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

Students should be able to use the following words confidently:

- Storage
- Hardware
- Secondary storage
- *Optical*
- *Magnetic*
- *Solid state*

Multiple Choice Questions will assess these keywords; use the MCQs supplied.

You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning for my students?

Activity 1 – sheet 1 is a support sheet to introduce the topic to lower achieving students.
Activity 2 – extension task and questions ask students to identify any further devices, and to start thinking about the characteristics of data.

Notes: *Use of Stretch and peer assessment task ideas supplied may support high end differentiation.*
You will need to modify the resources to meet the needs of your students specifically. You may wish to refer to Departmental or School policies on differentiation methods used within your centre.

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Low - can be used for lower achieving students, to help them identify devices.
Medium – students are to identify if each storage device is optical, magnetic or solid state and add other devices if they can.
High – students have to think of their own devices to populate the table. Extension activity for students to start thinking about the characteristics of each type of storage.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Low/Medium: Give each student a copy of 'L1 mind map'. This can be printed in A4 and A3. Ask students to complete the boxes, the grey ones are the three types of storage. For each type, give a definitions, list example devices and identify the characteristics
High. Ask students to produce their own mind map of the information they have learnt about storage devices.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 3/Extension

How will I challenge high ability students, or extend the lesson activities if needed?

Summary/Plenary

How will I check that students have retained the knowledge?

- Targeted questioning:
  - ask specific students the questions, or ask for a vote for multiple choice (students could have cards with the three types on that they hold up for some questions)
  - split the class into teams and ask them to write down their answers
  - swap the tests and mark.

Notes: *Use the MCQs to check basic understanding of Keywords and Topics.*
Use the LOR to develop deeper knowledge and allow Peer Assessment and Review. This can be developed to use the LOR ideas as homework etc.

Homework/flipped learning

Subtopic 1.2.2 – Secondary storage: Lesson 2 – Storing data

The big picture

Why is this relevant for the students?

1. How do you decide which storage device to buy? Do you own one? Why did you choose that one?
2. Ask students to discuss these questions, ask for their answers and get them to justify their choices with reference to the characteristics from last lesson

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning

Objectives

What should the students be confident/able to do at the end of the session?

1. Be able to recommend a storage device for a situation.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

How will I encourage engagement?

1. Give students the statement: *'A CD ROM is better than a USB memory stick'.*
2. Ask students what they think of this statement. Defend the statement and get students to argue against it. The aim is to get them to consider the scenario and purpose and realise how important that is to the statement.

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

Expected progress

- Recommend an appropriate storage device for a situation.
- Identify which types of file are likely to be larger than another.

Expected progress: This is likely to be activities and Learning tasks that meet your expectations for the class progress towards the objectives.

Good progress

- Give reasons why the choice of storage device is appropriate.

Good progress: This would show a development from basic understanding and be indicative that some students use stretch and challenge material during the lesson.

Exceptional progress

- Full explain, with multiple reasons linked to the scenario, why the choice of storage device is appropriate.

Exceptional progress: This would indicate the level of progress if all extension activities have been completed and at 8/9 levels of understanding.

The sticking points

What activities will the students undertake?

- What to consider when recommending a storage device.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

Students should be able to use the following words confidently:

- Storage
- Characteristic
- Estimate

Multiple Choice Questions will assess these keywords; use the MCQs supplied.
You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning for my students?

Activity 1 – sheet 1 is a support sheet to introduce the topic to weaker students
Activity 2 – extension task and questions ask students to identify any further devices, and to start thinking about the characteristics of data

Notes: *Use of Stretch and peer assessment task ideas supplied may support high end differentiation.*

You will need to modify the resources to meet the needs of your students specifically. You may wish to refer to Departmental or School policies on differentiation methods used within your centre.

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Low – students need to circle the most appropriate data type and then say why they chose it. Some hints about what to say in the 'why' column are given.
Medium – students need to choose and write the most appropriate type of data storage for each scenario given and explain why.
High - students need to recommend an appropriate type of data storage for each scenario given and justify their choice based on the different characteristics. This in the form of questions for students to write their answers in prose.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 2

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

- Ask students to work in pairs to put the files on the slide in order from smallest file size to largest.
- The following slide has the answer.

or

- Use the Multiple Choice Questions to check student's understanding

Notes: *Use the MCQs to check basic understanding of Keywords and Topics.*
Use the LOR to develop deeper knowledge and allow Peer Assessment and Review. This can be developed to use the LOR ideas as homework etc.

Homework/flipped learning

Subtopic 1.2.4 – Data storage: Lesson 1 – Numbers

The big picture

Why is this relevant for the students?

Being able to quantify how much storage data can take up can be useful for learners.

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning.

Objectives

What should the students be confident/able to do at the end of the session?

- Define the units: bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte.
- Know how data needs to be converted into a binary format to be processed by a computer.
- Know how to convert positive denary whole numbers (0-255) into 2-digit hexadecimal numbers and vice versa.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

How will I encourage engagement?

Starter that asks students to arrange units in order of size.

Notes: *This will engage students as they will have heard some terms but don't necessarily know what they are. This will then provide the hook for the rest of the lesson.*

Assessment for Learning

What am I looking for to show progress?

- Answering questions.
- Listening in to student discussion.
- Results in plenary quiz.

The sticking points

What do I want students to remember?

- 1 byte is 8 bits, 1 KB is 1024 bytes, 1MB is 1024 KB etc.
- The binary number system is used in computing to represent the two different states of transistors (on/off).
- Converting between binary and denary is made a lot simpler if students remember the positive 'power of two' numbers.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

Binary	Bit
Denary	Nibble
Hexadecimal	Byte
Conversion	Kilobyte
Transistor	Megabyte
Bit Binary	Gigabyte
	Terabyte
	Petabyte

Multiple Choice Questions will assess these keywords; use the MCQs supplied.
You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning for my students?

Students will be given the opportunity in Activity 1 to research and include details about what comes after Petabyte

Notes: *Asking students to research and discover knowledge themselves enables them to retain it more effectively. Students can also be asked differentiated questions based on ability.*

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students are to create a poster describing the different units needed for the specification.

Notes: *This will prove to be a visual revision tool for students when they want to re-cap. The best one could go up as a display for all students to refer to during lesson.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students to convert between binary and denary, answering the questions provided.

Notes: *This will rely on teacher demonstration, allowing students to see the sequential way of addressing the solution. Confident students could demonstrate how they worked out their answer to the rest of the class.*

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

Mini assessment using multiple choice questions.

Notes: *This can be done using a VLE that self assesses the students' answers. This can then be analysed to measure progress instantly.*

Homework/flipped learning

Subtopic 1.2.4 – Data storage: Lesson 2 – Characters

The big picture

Why is this relevant for the students?

Real world examples such as selecting language during installation.

Notes: *Using a real world scenario and example, helps students to see the relevance of what they are learning.*

Objectives

What should the students be confident/able to do at the end of the session?

1. Explain the use of binary codes to represent characters.
2. Explain the term character set.
3. Describe with examples (for example ASCII and Unicode) the relationship between the number of bits per character in a character set and the number of characters which can be represented.

Notes: *These are the core learning objectives that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

What will make the students want to learn?

Starter question: *'If you type your name into the keyboard, how does the computer know to present the correct character?'*

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

- Answering questions.
- Listening in to student discussion.
- Results in plenary quiz.

The sticking points

What do I want students to remember?

- The code the computer uses to understand text input is called ASCII.
- ASCII uses 8 bits to store characters, giving 256 possibilities.
- Unicode uses 16 bits to store characters, giving 65,536 possibilities.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

Character[16]
Binary
Unicode
ASCII
Bit
Conversion

Multiple Choice Questions will assess these keywords; use the MCQs supplied.
You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning for my students?

Students will be given the opportunity in Activity 1 to convert their message in Hexadecimal.

Notes: *Students can also be asked differentiated questions based on ability.*

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students are to think of a message and code it in Binary for their peer to work out.

Notes: *This allows students to re-cap on prior learning in a synoptic manner.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students to discuss the answers to a set of questions in pairs. The answers they come up with can then be fed back to the group.

Notes: *This type of activity allows students to come up with a joint answer. When this answer is fed back to the group, any misconceptions can be addressed by the teacher or high achieving students.*

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

Mini assessment using multiple choice questions.

Notes: *This can be done using a VLE that self assesses the students' answers. This can then be analysed to measure progress instantly.*

Homework/flipped learning

Subtopic 1.2.4 – Data storage: Lesson 3 – Images

The big picture

Objectives

What should the students be confident/able to do at the end of the session?

1. Understand how a digital image is made up and be able to recognise the effect changing the resolution has on an image.
2. Understand how a computer displays coloured images using binary and RGB values.

Notes: *These are the core learning objectives that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

The students will also see a success criteria in the lesson so that they know what they need to understand and demonstrate to meet these objectives.

Engagement

What will make the students want to learn?

Relating this topic to the pictures on their phones will make it relatable to them.

Notes: *A short discussion at the start of the lesson about 'selfies' and TV screens – including pixels.*

Assessment for Learning

What am I looking for to show progress?

- Answering questions.
- Listening in to student discussion.
- Being able to correct each other if they are wrong.
- Discussion including key words at the end of the lesson.

The sticking points

What do I want students to remember?

- That bitmap images are made up of pixels.
- How images are represented in Binary 1's and 0's.
- How different colours are introduced using binary and to understand about direct colour.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

Binary
Pixels
Pixel depth
Direct colour
Converted
Resolution

The questions at the end of the presentation will assess the use and understanding of these key words, by assessing how and if the students have used them to answer the questions based on the lesson topic.

Notes

Differentiation

How will I enable access to each area of learning?

Students will have the opportunity to spend further time Q&A before they are asked to complete the questions.

Notes: *Students can also be asked differentiated questions based on ability.*

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students are to answer questions that require them to use all knowledge from the lesson so that they can answer the questions thoroughly.

Notes: *This allows students to re-cap on lesson topics in an independent manner.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students to create their own pixel image and show the binary representation.

- Challenged further – can they add more than two colours?

Notes: *This type of activity allows students to think further and use knowledge from the lesson to conclude an answer that the teacher hasn't given a great example of – inspires independent learning and independent goal setting.*

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

Mini assessment using Q&A – half the class vs. half the class

Notes: *This can be done using a VLE that self assesses the students' answers. This can then be analysed to measure progress instantly.*

Homework/flipped learning

Subtopic 1.2.4 – Data storage: Lesson 4 – Sound

The big picture

Objectives

What should the students be confident/able to do at the end of the session?

1. Understand how sound is stored into binary values.
2. Understand the factors that affect how sound is stored and how this affects the memory needed for storage.
3. Understand and be able to explain why the factors affect memory storage and how this can be overcome through file compression.

Notes: *These are the core learning objectives that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

The students will also see a success criteria in the lesson so that they know what they need to understand and demonstrate to meet these objectives.

Engagement

What will make the students want to learn?

Relating this topic to saving sound and images – which takes up more room?

Notes: *A short discussion at the start of the lesson about audio and how audio recordings have progressed over time.*

Assessment for Learning

What am I looking for to show progress?

- Answering questions.
- Listening in to student discussion.
- Being able to correct each other if they are wrong.
- Discussion including key words at the end of the lesson.
- Understanding through explanations in their answers.

The sticking points

What do I want students to remember?

1. How audio is stored and converted to binary.
2. The factors that affect the quality of the audio file
3. How the factors affect the quality and the size of the audio file

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

- Binary
- Conversion
- Sample frequency/rate
- Sample size/bit depth
- Compression

The questions at the end of the presentation will assess the use and understanding of these key words, by assessing how and if the students have used them to answer the questions based on the lesson topic.

They are asked to complete independent research to learn about file compression so this should be questioned at the end to check correct understanding You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning?

Students will have the opportunity to spend further time Q&A before they are asked to complete the questions. There are Q&A opportunities throughout the presentation and even after every slide if needed.

Notes: *Students can also be asked differentiated questions based on ability.*

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students are to answer questions that require them to use all knowledge from the lesson so that they can answer the questions thoroughly.

Notes: *This allows students to re-cap on lesson topics in an independent manner.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students are to build on their knowledge to be able to answer questions based on the lesson content.

Notes: *This type of activity allows students to think further and use knowledge from the lesson to compose a thorough answer.*

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

Independent research so that they are responsible for furthering their knowledge.

Notes: *They are advancing their knowledge to understand what file compression is and will be asked to discuss this within the class as a group to ensure all are of a correct understanding.*

Homework/flipped learning

Subtopic 1.2.5 – Compression: Lesson 5

The big picture

Why is this relevant for the students?

Real world examples such as sending attachments with small file sizes.

Notes: *Using a real world scenario and example, helps students to see the relevance of what they are learning.*

Objectives

What should the students be confident/able to do at the end of the session?

1. Understand the need for compression.
2. Know the difference between lossy and lossless compression.
3. Analyse when lossy and lossless would be used.

Notes: *These are the core learning objectives that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives.*

Engagement

What will make the students want to learn?

Starter question that asks why an error message happens and what can be done to prevent it?

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

- Answering questions.
- Listening in to student discussion.
- Marking of class work.
- Results in plenary quiz.

The sticking points

What do I want students to remember?

- The benefits of compressing data.
- Lossy compression loses quality but is not noticeable so can still be used.
- Lossless compression does not lose any quality. This is due to looking for patterns in the data and representing the data more efficiently.
- Examples for lossy are images and video.
- Examples for lossless are text files and source code.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

What exam/specification specific words should the students be confident with and need to know?

- Lossy
- Lossless
- Compression
- MPEG
- JPEG
- Attachment

Multiple Choice Questions will assess these keywords; use the MCQs supplied.

You may wish to customise these as needed.

Notes

Differentiation

How will I enable access to each area of learning?

Students will be given the opportunity to research Huffman coding as an extension.

Notes: *Students can also be asked differentiated questions based on ability.*

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students to think about why an email attachment won't send and if there is anything that we can do to decrease the file size.

Notes: *This allows students to link the theory with a real world concept. It should act as a hook for learning and something they can take away from the lesson, to help in how they use a computer e.g. emails.*

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Students to discuss the answers to a set of questions. The answers they come up with can then be fed back to the group.

Notes: *This type of activity allows students to come up with an answer of their own. When this answer is fed back to the group, any misconceptions can be addressed by the teacher or high achieving students.*

Activity 3/Extension

Summary/Plenary

How will I check that students have retained the knowledge?

Mini assessment using multiple choice questions.

Notes: *This can be done using a VLE that self assesses the students' answers. This can then be analysed to measure progress instantly. An alternative way could be to use an interactive quiz like kahoot to make the exercise more enjoyable.*

Homework/flipped learning

Subtopic 1.2.3 – Units: Lesson

The big picture

Why is this relevant for the students?

1. Ask students to discuss these questions, ask for their answers and get them to justify their choices with reference to the characteristics from last lesson

Notes: *Use Context Setting task to engage students and create discussion.*
May link to flipped resources if you use flipped learning.

Taught out of sequence as calculating units is simpler once students have studied the storage types.

Objectives

What should the students be confident/able to do at the end of the session?

1. Estimate data capacity requirements for different file types.

Notes: *These are the core learning that the students should develop during the lesson. This will link to the activities that provide ability to assess the Objectives*

Engagement

How will I encourage engagement?

Notes: *A short activity that stimulates the students. Ideas taken from big picture activity could be used.*

Assessment for Learning

What am I looking for to show progress?

Expected progress

- Identify which types of file are likely to be larger than another.

Expected progress: This is likely to be activities and Learning tasks that meet your expectations for the class progress towards the objectives.

Good progress

- Estimate the file size of a number of different types of file (at least two).

Good progress: This would show a development from basic understanding and be indicative that some students use stretch and challenge material during the lesson.

Exceptional progress

- Estimate the file size of text files, databases, image and sound files taking into account overheads.
- Convert file size calculations into an appropriate measurement.

Exceptional progress: This would indicate the level of progress if all extension activities have been completed and at 8/9 levels of understanding.

The sticking points

What activities will the students undertake?

- How to estimate the size of a range of files.

Notes: *A list of concepts that you want the students to remember by the end of the lesson.*

Keywords

Students should be able to use the following words confidently:

- Storage
- Estimate
- Overheads

Multiple Choice Questions will assess these keywords; use the MCQs supplied.

You may wish to customise these as needed.

Notes

Taught out of sequence as calculating units is simpler once students have studied the storage types.

Differentiation

How will I enable access to each area of learning for my students?

Notes: *Use of Stretch and peer assessment task ideas supplied may support high end differentiation.*

You will need to modify the resources to meet the needs of your students specifically. You may wish to refer to Departmental or School policies on differentiation methods used within your centre.

Activity 1

What tasks will I ask the students to complete to develop their understanding during the lesson?

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 2

What tasks will I ask the students to complete to develop their understanding during the lesson?

Low/Medium - students need to estimate the file size of each of the files described. Hints and reminders are given as to the formulae.
High – students are not given any hints and have to convert the answers into a different measurement.

Notes: *Use the Activities given to develop the students' knowledge of the topic. Each activity may need further differentiation/adaptation for your needs.*
Reference the Common misconceptions and FAQ document to support your delivery of the topic.

Activity 3/Extension

How will I challenge high ability students, or extend the lesson activities if needed?

Summary/Plenary

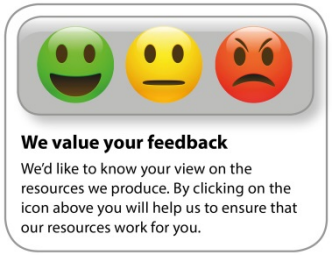
How will I check that students have retained the knowledge?

- Use the Multiple Choice Questions to check student's understanding.

Notes: *Use the MCQs to check basic understanding of Keywords and Topics.*

Use the LOR to develop deeper knowledge and allow Peer Assessment and Review. This can be developed to use the LOR ideas as homework etc.

Homework/flipped learning



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