Topic 1.1 – Systems architecture: Lesson 1

FIRST ASSESSMENT SUMMER 2022

The big picture

Why is this relevant for the students?

Question given to the learners to spark interest in the topic – '1969 was a year famous for what….?'

- Collect responses/guesses from learners.
- Lead into answer with suggestions such as: Travel, Mission, Space, Lunar.
- 1969 – Man on the Moon – Apollo 11 Spaceship.

Follow up questions:

- What typical computing hardware may be inside Apollo Guidance Computer?
- What would be the brains of the Computer? Lead into Processor.

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?

- Be able to describe the purpose of the CPU.
- Be able to state the function of the CPU (fetch and execute instructions stored in memory).

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?

- Discussion lead in from the big picture activity; look at the power of the computer systems when the first space shuttle launched.
- Investigate Space X and compare it to Apollo 11.

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

Keywords

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

- Processor
- Execute
- Fetch
- Decode
- Storage
- CPU

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

The sticking points

What do I want students to remember?

CPU carries out instructions and process data:

- CPUs fetch data and instructions from main memory, process/execute and store the result in main memory.
- Process known as the fetch –decode-execute cycle.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to describe the purpose of the CPU.
- To be able to understand the fetch-execute-cycle.

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

Good progress

- To be able to describe the purpose of the CPU in detail.

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

- Understand the fetch-execute-decode cycle.

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

Notes:

Differentiation

How will I enable access to each area of learning?

- Some students may be more aware of different types of processors than others – use these students as Lead Students.
  - Do any students understand the fetch-decode-execute cycle?
- Differentiated within tasks.
- Questioning to challenge students.
- Research tasks around features of Operating Systems.
- YouTube videos to demonstrate FDE cycle and the CPU.

Notes: *Use of stretch 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?

- Students to complete an activity sheet Input, output and storage devices.
- Extension: Research different types of processor from a PC specialist seller.

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?

- Using their understanding from Activity 1 students can begin to think about the FDE cycle and the CPU and complete a True and False table.

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?

- Questioning.
- Produce one question and Mark Scheme.
- Exit Pass – Describe the FDE cycle.

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

Investigate the purpose of the CPU and how the fetch-decode-execute cycle works.

There are many YouTube videos to pick from.

Topic 1.1 – Systems architecture: Lesson 2

The big picture

Why is this relevant for the students?

Questions recalling content from the previous lesson:

- Recall questions:
  - What is the purpose of the CPU?
  - Why is the CPU so important?
- What are the main issues with production of processors today?

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?

- Be able to describe the common CPU components and their function.
  - ALU (Arithmetic Logic Unit)
  - CU (Control Unit)
  - Cache
  - Registers.

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?

Discussion of the following:

- What are the main issues with production of processors today?
  - The issue with size of processors in production they are getting so small.
  - Heat issues.

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Keywords

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

- Processor
- Instruction
- Arithmetic Logic Unit
- Control Unit
- Cache
- Registers
- Accumulator

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

The sticking points

What do I want students to remember?

- ALU and that it performs calculations and logic operations.
- CU is like an orchestra organising the flow of data and instructions.
- Cache and how it sits next to the CPU and RAM.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to state the purpose of the ALU.
- To be able to describe the fetch-execute process.

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

Good progress

- To be able to explain the registers.
- To be able to understand the logical operations AND/OR.

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

- To be able to understand the different levels of cache.
- To be able to understand the need for the registers and how data/instructions flows.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Differentiated within tasks.
- Questioning to challenge students.
- Peer support.

Notes: *Use of stretch 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?

- Students are given a diagram of how the levels of memory, order closest to further away of storage to the CPU.
- Students can see how size of memory/storage compares to the cost implications.

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?

- Students research the acronyms for the different registers.
- Students have to explain key terms from the lesson.

Notes*: Use the Activities given to develop 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?

- Questioning
- Produce Question + Mark Scheme
- Exit Pass – Describe the differences between the ALU and the CU.

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

Homework/flipped learning

Investigate the registers in more detail; get students to create their own diagrams to represent the CPU.

Share thoughts with class in the following lesson.

Topic 1.1 – Systems architecture: Lesson 3

The big picture

Why is this relevant for the students?

- What is the purpose of the processor? Discuss why we need processors, going back to the idea that it is the 'brain' of a computer.

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?

- Be able to explain computer systems.
- Be able to explain memory and I/O devices.
- Be able to explain the different buses.
- Explain the types of Peripherals.

Engagement

What will make the students want to learn?

- Ask students if they have they built their own computer. Get students who have to discuss how they picked their processor.
- Why is it important to have a good processor? Have a discussion.

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

Keywords

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

- MAR (Memory Address Register)
- MDR (Memory Data Register)
- Accumulator
- ALU (Arithmetic Logic Unit)
- CU (Control Unit)
- Cache
- Fetch/Execute
- Buses

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

The sticking points

What do I want students to remember?

- Functions of the CPU.
- The different registers used by the CPU.

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to explain a computer system.

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

Good progress

- To be able to outline common CPU Components.
- To be able to explain the key features of ALU, CU, cache and registers.

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

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

Notes

Differentiation

How will I enable access to each area of learning?

- Differentiated within tasks.
- Questioning to challenge students.
- Peer support.
- YouTube videos to demonstrate common CPU components and their functions.
- Independent research.

Notes: *Use of stretch 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?

- Students have a research task to investigate the different buses.
- Explain what peripherals are in a computer system.

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?

- Students will be given a worksheet where they have to show their understanding of the types of Memory. Also consolidating the importance of cache and how close each component sits next to the CPU.

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?

- Questioning
- Produce question + Mark Scheme
- Exit Pass – Describe the differences between the buses.

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

Homework/flipped learning

Create a poster/leaflet for the types of buses, peripherals and how the processor works.

Topic 1.1 – Systems architecture: Lesson 4

The big picture

Why is this relevant for the students?

- Where are instructions that are currently in use stored?
- What else is stored in main memory?
- How are instructions executed by the processor?

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?

- Understand the Von Neumann architecture.
- Describe the MAR and MDR.

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?

- What is RAM used for?

Discuss how currently running programs are stored in RAM and the reasons why

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

Keywords

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

- Von Neumann Architecture
- MAR (Memory Address Register)
- MDR (Memory Data Register)
- Program Counter
- Accumulator
- ALU (Arithmetic Logic Unit)
- CU (Control Unit)
- Cache
- Fetch/Execute
- Buses

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

The sticking points

What do I want students to remember?

- CPU, ALU, CU and Cache.
- The role of MAR and MDR.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to briefly describe the purpose of the accumulator, ALU and CU.

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

Good progress

- To be able label confidently an internal diagram for a CPU.

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

- To describe in detail the roles and processes of the CPU.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Initial discussion of the processor. This can be differentiated by which students have had experience with.
- Differentiated within tasks.
- Questioning to challenge students.
- Stronger students can study more on the interaction between the different registers.
- Video explaining this.

Notes: *Use of stretch 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?

- An activity based around labelling the internal components of a CPU.
- Explain key terms.

Notes: *Use the Activities given to develop the student's knowledge of the topic. Each activity may need further differentiation/adaptation for you 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?

- Complete the Von Neumann Architecture diagram.

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?

- Questioning.
- Produce question + Mark Scheme.
- Exit Pass – Describe the registers and what each do.

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

Explore types of the CPU further.

Read and watch video on the following webpage before next lesson.
https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/2

Topic 1.1 – Systems architecture: Lesson 5

The big picture

Why is this relevant for the students?

Question given to the students to spark interest in the lesson:

- Why have processors got smaller?

Discussion point.

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?

- The describe the importance of the Program Counter in the fetch-execute cycle.
- Understand how fetch-decode-execute works in more detail.

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?

- Continue discussion from the big picture.
- Show a video of the manufacture of processors: https://www.youtube.com/watch?v=qm67wbB5Gml

Keywords

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

- Von Neumann Architecture
- MAR (Memory Address Register)
- MDR (Memory Data Register)
- Program Counter
- Accumulator
- ALU (Arithmetic Logic Unit)
- CU (Control Unit)
- Cache
- Fetch/Execute
- Buses

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

The sticking points

What do I want students to remember?

- How the instructions and data flow around the CPU.
- What the registers do.
- How the FDE cycle works with the registers.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to briefly describe the PC in the FDE cycle.

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

Good progress

- To be able explain why FDE cycle in more detail.

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

- To model the FDE cycle and the interaction of the registers.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Initial discussion of FDE cycle and how it works with the registers.
- Differentiated within tasks.
- Questioning to challenge students.
- Stronger students can study more on defragmentation.

Notes: *Use of stretch 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?

- Students label the diagram of the CPU.

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?

- The purpose of this task is to simulate the fetch-decode execute cycle within the class. The following roles are needed so this is best suited to work for groups of five.

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?

- Questioning.
- Produce Question + Mark Scheme.
- Exit Pass – Describe the FDE cycle.

Homework/flipped learning

To take Activity 1 home and ask students to create their own diagram.
Ask students to create a knowledge organiser for lessons 1-5.

Topic 1.1 – Systems architecture: Lesson 6

The big picture

Why is this relevant for the students?

Question given to the students to spark interest in the lesson:

- What are supercomputers?
- Why were supercomputers developed?

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?

- Be able to describe how common characteristics of CPUs affect their performance:
  - Clock speed
  - Cache size
  - Number of cores.

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?

- What processing power does your computer at home have? Typically?
- Are you aware of the processing power of your mobile phone? Tablet?
- How is processing power measured?
- Guess at Processing Power of the Apollo Guidance Computer (AGC)
  - Compare to iPhone 10

Ask students to investigate the uses of supercomputers and how could they help society.

Keywords

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

- Processor
- MHz
- GHz
- Hertz
- Instruction
- Clock Speed
- Cache
- Core

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

The sticking points

What do I want the students to remember?

- The common characteristics that affect performance
  - Clock speed
  - Cache size
  - Number of cores

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to briefly describe the three characteristics of a CPU.

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

Good progress

- To be able know how the characteristic affect the performance

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

- To be able to identify more characteristics that can affect the performance of the CPU.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Initial discussion of speed of computers; this can be differentiated by which students have had experience with building PCs.
- Differentiated within tasks.
- Questioning to challenge students.
- Stronger students can study more on compression.

Notes: *Use of stretch 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?

- Students research what the characteristic are and how they affect the CPU performance.

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?

- Produce a guide explaining the development of the CPU over the last 20 years. Include descriptions of Processor:
  - speed
  - number of cores
  - cache size.
- Within the guide explain the concept of Moore's Law.
- Find diagrams of different CPUs – label these.

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?

- Exit Pass – Describe one feature of file management.
- Students think of an exam style question on a sticky note - they pass the note to the left and each student has to answer the question.

Homework/flipped learning

Research how much extra cores and bigger cache would cost. Find out how the most expensive cache and how big the cache is.

Topic 1.1 – Systems architecture: Lesson 7

The big picture

Why is this relevant for the students?

Question given to the students to spark interest in the lesson:

- **What is a GPU?**
- **Why would you upgrade your GPU before your CPU?**

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?

- Understand how to estimate the best performing CPUs.

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?

Follow on from the big picture question: ask students to explain 'on board' graphics term and 'on board' cache - what are the differences?

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

Keywords

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

- Processor
- MHz
- GHz
- Hertz
- Instruction
- Execute
- Embedded System
- Clock Speed
- Cache
- Core

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

The sticking points

What do I want the students to remember?

- Clock speed, cache size and number of cores have an effect on the performance speed of a processor.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to briefly explain how to determine the best performing CPU.

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

Good progress

- To be able to describe the effects of increasing the clock speed on the computer's performance
- To be able to describe the effects of increasing the cache size on the computer's performance
- To be able to describe the effects of increasing the number of cores on the computer's performance.

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

- To be able to give the specific effects on performance time of improving the clock speed and number of cores on a CPU.
- To be able to describe how data/instructions are fetched from main memory.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Some students may be more aware of processors and different types – using these students as Lead Students.
- Differentiated within tasks (Performance of Computers).
- Questioning to challenge students.
- Research tasks.

Notes: *Use of stretch 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?

- Students complete the activity on the performance of CPUs.

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?

- Students have a specification for two different PCs - they have to justify which one they would buy using the characteristics of the CPU to answer the question.

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?

- Questioning.
- Produce one question + Mark Scheme.
- Exit Pass – Describe the purpose of a CPU.
- Exit Pass – Describe the effect of number of cores/ cache size/processor speed on performance.

Homework/flipped learning

Create revision notes from BBC Bitesize about factors affecting CPU performance:
https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/4

Topic 1.1 – Systems architecture: Lesson 8

The big picture

Why is this relevant for the students?

Question given to students to spark interest in the lesson:

- Do you have a microwave at home?
- Have you used contactless payments?
- Do you use a washing machine?
- Are the above computers?
  - If yes why?
  - If no why?

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?

- To understand 'embedded systems' regarding:
  - their characteristics
  - their purpose.

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?

- Using the big picture ask students to identify computer systems
  - Medical
  - Manufacturing
  - Retail
  - Finance
  - Building
  - Science

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

Keywords

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

- Digital device
- Embedded System
- Function
- Microprocessor
- RAM
- ROM
- CPU
- UI (User Interface)

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

The sticking points

What do I want the students to remember?

- What an embedded system is.
- General purpose computers are not embedded systems.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to describe briefly what an embedded system is.

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

Good progress

- To be able know the difference between general computers and embedded systems

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

- To explain in depth how embedded systems are used and why we need them.

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

Notes

Differentiation

How will I enable access to each area of learning?

- Initial discussion of embedded systems by which students have had experience of.
- Differentiated within tasks.
- Questioning to challenge students.
- Stronger students can study more on the characteristic

Notes: *Use of stretch 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?
Watch the video https://www.youtube.com/watch?v=oPn_adIC1Q0

- Produce a list of embedded systems found around the home.
- Discuss the purpose of these with your partner.
- Would you ever need to write a proper program for these?
- Why do you think that we have embedded systems?
- What are the benefits and drawbacks of embedded systems? Make a list of these.

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

- Create a single page of images of embedded systems. Add to the reverse a list of the characteristics of embedded images.
- Create a Python program that displays either the name of a device or a characteristic of an embedded system. The user has to identify if it is an embedded system or not.

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?

- Exit ticket – give one characteristic of an embedded system or an example of an embedded system.

Homework/flipped learning

Look around the home to find embedded computer systems, make a list.

Topic 1.1 – Systems architecture: Lesson 9

The big picture

Why is this relevant for the students?

Question given to the students to spark interest in the lesson:

- Is a computer an embedded system?

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?

- Be able to give examples of embedded systems.

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?

- Using the homework from last lesson discuss the embedded systems they found.

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

Keywords

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

- Processor
- MHz
- GHz
- Hertz
- Instruction
- Execute
- Embedded system
- Clock Speed
- Cache
- Core

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

The sticking points

What do I want the students to remember?

- Computers are not embedded systems.
- They are single microprocessors.
- They have RAM , Rom and a CPU.

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

Assessment for Learning

What am I looking for to show progress?

Expected progress

- To be able to identify some embedded systems.

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

Good progress

- To describe the purpose of many embedded systems.

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

- To identify and describe the components of an embedded system

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

Notes

Differentiation

How will I enable access to each area of learning?

- Initial discussion of embedded systems differentiated by which students have had experience with them.
- Differentiated within tasks.
- Questioning to challenge students.
- Stronger students can study more on complex embedded systems such as a car that has multiple embedded systems.

Notes: *Use of Stretch 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?

- You have to design an electronic toy for a baby. In pairs, discuss:
  - what type of toy, then
  - inputs
  - outputs
  - functions it will perform.

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

- Students complete the activity on explaining the embedded systems, using the concept of input, output and process.

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

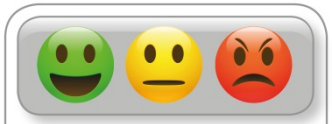
How will I check that students have retained the knowledge?

- Questioning.
- Exit ticket – give an example of an embedded system.
- Exam question practice.

Homework/flipped learning

Create a knowledge organiser on embedded systems lessons 8 and 9.

Make revision notes from BBC Bitesize
https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/5



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