Portfolio Evidence: Network topology Lesson Plan Extract

Subject: A-Level Computer Science
Topic: Network topology
Class: KS4, 12 students
Focus: Reflective Practice

This annotated lesson plan extract shows how I used active learning, formative assessment and professional feedback to reflect on my teaching.
The lesson was designed to make an abstract Computer Science concept more concrete through physical modelling, disaster-card scenarios and client-based application tasks.
My reflection and HoD/mentor feedback helped me identify both the strengths of the lesson and the next steps for improving students' written explanations and individual accountability during group work.

<table>
<tr><td>Learning Context</td><td colspan="2">Students have prior IGCSE knowledge of data transmission, including packets, destination addresses, routers, and the idea that devices communicate across a network. This lesson builds on that knowledge by introducing AS-level network topology: how devices are arranged and connected. Students will explore bus, star, mesh and hybrid topologies through diagrams, physical modelling, discussion and short written tasks, helping them understand structure, reliability and suitability for different scenarios.</td></tr>
<tr><td rowspan="2">Aims for learning</td><td>Learning Objectives:</td><td>Evidence of Learning:</td></tr>
<tr><td>By the end of the lesson, students should be able to:
1. Describe what a network topology is.
2. Recognise and describe bus, star, mesh and hybrid topologies.
3. Explain what happens when part of a network fails.
Choose a suitable topology for a given situation and justify their choice using appropriate Computer Science terminology.</td><td>By the end of the lesson, pupils will have:
• identified the structure of bus, star, mesh and hybrid topologies from simple diagrams;
• physically modelled one topology in small groups;
• responded to "disaster cards" by deciding whether their topology survives, partly survives or fails;
• completed a short client-scenario task using a structured sentence frame;</td></tr>
<tr><td>Anticipated misconceptions and planned responses</td><td colspan="2">• Topology may be confused with transmission method. I will clarify that topology describes how devices are connected, not whether data is serial/parallel or simplex/duplex.
• Pupils may think star is always best. I will use scenario questions to show that suitability depends on cost, reliability, expansion and the impact of failure.
• Pupils may think mesh means every network device must connect directly to every other device. I will distinguish a fully connected classroom model from the broader idea of multiple paths/redundancy.
• Pupils may think that hybrid topology is a completely separate shape. I will explain that hybrid combines different topologies or supporting technologies, such as connecting an existing wired LAN to a new wireless LAN</td></tr>
<tr><td>Adaptive and inclusive teaching</td><td colspan="2">• Support: diagrams, role cards, sentence starters and a keyword bank will be used to reduce language load.
• EAL support: pupils will rehearse answers orally before writing; teacher will model one full justification sentence.
• Challenge: stronger pupils will compare trade-offs such as cost versus reliability and explain why a hybrid topology may be chosen for a school campus.</td></tr>
</table>

	• Collaboration: groups of four allow all pupils to take a visible role during the movement task while reducing pressure on quieter pupils.

Element	**Time**	**What is the learning focus?** What will students be learning – linked to Learning Objectives.	**What will be happening in the classroom?** Outline specific actions you need to take as a teacher as well as what students will be doing.	**How will I check they are learning (formative assessment)?** What strategies will you use?	**Resources / Environment / Classroom Management**
Start of Lesson Routine (creating a climate for learning)	0–5 min	Start of lesson routine and recall from IGCSE data transmission	*[Reflection focus: activating prior knowledge]* *Mini-whiteboards helped make students' prior understanding visible before introducing the new AS-level concept of topology.* Pupils will recall prior knowledge about networks, packets, destination addresses and routers. The teacher will display recall questions and ask students to answer on mini-whiteboards. The teacher will then link this to the new lesson: "In IGCSE, you learned how data travels through a network. Today we will study how devices are connected in a network. This is called topology."	Mini-whiteboard responses. Cold calling with supportive follow-up questions. Teacher checks whether students can recall key ideas before introducing new content. Misconceptions are addressed immediately.	Slides, mini-whiteboards, pens. Students seated and ready. Clear routine: write answer, hold board up, listen to feedback.
Introduction	5–7 min	Learning objectives and success criteria	Pupils will understand the purpose of the lesson. The teacher will introduce the learning objectives.	Teacher questioning to check understanding of vocabulary	Learning objectives slide. Teacher keeps this section brief to preserve time for activity.
Main body of lesson	7–15 min 15–23 min	Direct instruction: introducing bus, star, mesh and hybrid topologie Movement activity: physically modelling topologie	Pupils will learn the basic structure of the four topologies. The teacher will show simple diagrams and give short descriptions. For each topology, the teacher will mention one strength and one weakness. Students will be asked to identify the key feature of each diagram. *[Reflection focus: making an abstract concept concrete]* *Students used string and role cards to model network structures physically, helping them understand bus, star and mesh topologies beyond diagrams.* Pupils will apply understanding by physically building a topology. The teacher divides 12 students into 3 groups of 4. Group 1 models bus, Group 2 models star, Group 3 models mesh. Each group receives a topology card, role cards and	Targeted questioning after each topology. Students may use thumbs up/down or mini-whiteboards for quick checks. Teacher circulates and asks probing questions: "Where would the message travel?" "What is the central device?"	Topology diagrams on slides. Teacher avoids over-explaining; the purpose is to prepare students for the movement task. Role cards, topology cards, strings, message packet card. Safety instructions before

	23–30 min 30–36 min	Disaster-card comparison: reliability and failure Client challenge: choosing and justifying a topology	string. Bus group uses one shared string. Star group has one switch and three computers. Mesh group uses multiple strings to show direct connections. Pupils arrange themselves and prepare to explain how data would travel. *[Reflection focus: revealing understanding through scenarios] Disaster cards helped students move from naming topologies to reasoning about reliability, failure points, expansion and suitability.* Pupils will predict what happens when part of a network fails. The teacher gives one disaster card at a time, such as: one computer fails, one cable fails, the central switch fails, many more users join, or the budget is limited. Each group chooses one response card: Survives, Partly survives, or Fails. Groups hold up their answer and explain. *[Reflection focus: supporting technical explanation] The sentence frame supported students in turning oral reasoning into a structured written justification using Computer Science terminology.* Pupils will apply knowledge to a realistic scenario. Each group receives one client scenario, such as a computer lab, hospital emergency system, small temporary classroom, or existing wired LAN plus new WiFi. Pupils complete a short response sheet: "I would choose ___ because ___. One advantage is ___. One disadvantage is ___. It is suitable because ___." Groups briefly share their recommendation.	"How many links are needed?" Each group gives a short explanation. Teacher checks for correct structure and terminology. Formative assessment through group responses and explanations. Teacher listens for accurate reasoning, not only correct card choice. Follow-up questions: "Why?" "Does this disaster apply to your topology?" "What evidence from the structure supports your answer?" Teacher collects verbal and written evidence. Assessment focus: can students justify their choice using correct terminology? Teacher may ask one student from each group to explain, then ask another student to add one advantage or disadvantage.	movement. Teacher uses clear attention signal to stop and refocus students. Disaster cards, response cards: Survives / Partly survives / Fails. Teacher manages discussion so all groups contribute. Positive reinforcement for precise vocabulary. Scenario cards, response sheets, sentence frames. Supports EAL students and keeps discussion structured. Teacher circulates to support weaker groups.
Plenary	36–40 min	Plenary, individual practice check and exit ticket	*[Reflection focus: checking individual understanding] The exit ticket provided individual evidence of whether students could identify, compare and justify network topologies independently.* Pupils complete a short independent check or exit ticket. The teacher reviews answers quickly or collects them for later	Exit ticket provides individual evidence of learning. Teacher checks whether students can identify and compare topologies independently. Results will inform the next lesson.	Exit ticket slide or printed slips. Students answer independently. Teacher maintains quiet routine and collects responses before dismissal.

			analysis.		

Lesson evaluation
Overall, I believe the lesson was successful and that the learning objectives were met. The lesson started with a recall activity using mini-whiteboards, which helped pupils connect the new topic of network topology to their previous IGCSE knowledge of networks, packets and routers. This made the transition into the new content clearer and supported pupils in understanding that topology is about how devices are connected. The physical modelling activity worked well because it made an abstract topic more concrete. Pupils used string and role cards to represent bus, star and mesh topologies, and this helped them understand how data travels and what happens when part of the network fails. For example, StudentA took part in modelling the star topology and helped show how messages pass through the central switch. StudentB was able to recall why data is divided into packets, and StudentC correctly identified that a hybrid topology would be suitable when combining different types of networks. These examples show that pupils were able to connect prior knowledge with the new topic. The scenario tasks also supported progress because pupils had to choose a suitable topology for situations such as a computer lab, a temporary classroom, a school extension and a hospital network. This moved pupils beyond simply naming the topology and encouraged them to justify their choices using ideas such as cost, reliability, expansion and failure. Most pupils remained engaged and productive during the lesson. There were moments where I needed to remind pupils to work collaboratively, but the class responded well and completed the exit ticket independently. Next time, I would provide a clearer keyword bank and one model answer before the written task, so pupils can make their explanations even more precise. Overall, pupils made good progress from recognising topologies to explaining and justifying their use in realistic scenarios.
What I learned and next steps
This lesson reinforced the value of making abstract Computer Science concepts concrete. Network topology can be difficult for students to understand if it is taught only through diagrams and definitions. The physical modelling activity helped students experience the structure of bus, star and mesh topologies more clearly, especially when they had to show how messages travelled through the network and what happened when part of the network failed. The disaster-card activity was particularly useful because students had to consider reliability, failure points, expansion and suitability, which supported more analytical thinking. The client-scenario task then helped students apply this understanding to realistic situations, such as a computer lab, a temporary classroom, a school extension or a hospital network. The lesson also showed the importance of structured language support. Some students could identify the correct topology orally, but needed more support to explain their reasoning precisely in English. In future, I would provide a clearer keyword bank and one model answer before the written task, so that students can use terms such as switch, reliability, expansion, failure, cost and hybrid more accurately. For the next lesson, I would use the exit ticket and written scenario responses to identify which students can justify topology choices independently and which students need further modelling. I would also add a short individual checkpoint after the group activity to check that each student understands the concept, rather than relying only on group explanations.