SEMtech!

Student Engagement & Mentoring in Technology

Interactive Design Ideas for “Internal Computing Components”

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1. Virtual Disassembly Lab

Objective: Help students explore and identify internal computer components by virtually “opening up” a machine and inspecting its parts.

Description:
A simulated **drag-and-discover** experience where learners:

- Click to remove the **computer case**, revealing internal parts.
- Click each component (e.g., **CPU**, **GPU**, **RAM**, **PSU**) to see:
  - Name
  - Function
  - Volatility (RAM vs. HDD/SSD)
  - Key specs (e.g., GHz, cores, bit addressing)

Key Features:

- Animated motherboard with labeled ports and slots.
- Pop-ups for BIOS/UEFI functions and startup sequence.
- Side-by-side comparison (e.g., SSD vs. HDD: speed, capacity, price).

Learning Outcomes:

- Reinforce **hardware recognition**.
- Develop **functional understanding** of each part.
- Encourage **systems integration awareness**, per Negroponte’s model of digital environments.

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2. CPU Performance Tuner

Objective: Visualize how CPU characteristics (clock speed, cores, architecture) affect system performance under different workloads.

Description:
An interactive simulator where learners:

- Select a task (e.g., **web browsing**, **video rendering**, **AI training**).
- Adjust CPU parameters: GHz, core count, 32-bit vs. 64-bit architecture.
- See visual performance output: "Estimated completion time: 3.2 seconds" or "System overheating—activate cooling."

Key Features:

- Toggle between single-core and multi-core performance.
- Educational tooltips explaining bottlenecks.
- Thermal meter showing need for cooling/PSU consideration.

Learning Outcomes:

- Understand how **CPU specs impact computing tasks**.
- Evaluate **hardware needs for different roles** (gamer, designer, analyst).
- Reflect on **Arthur's principle** of performance scaling through modularity.

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3. Interactive System Builder Challenge

Objective: Apply knowledge by assembling a system tailored to a user's needs using correct internal components.

Description:
Students are given real-world use cases:

- "Build a workstation for a data scientist."
- "Assemble a budget gaming rig."
- "Design a basic admin office PC."

They must choose:

- CPU type and speed
- GPU (if needed)
- RAM capacity
- Storage (SSD/HDD)
- Cooling and power setup
- NIC type (onboard vs. USB adapter)

Key Features:

- Performance score and cost tracker.
- Compatibility alerts ("Chosen PSU does not support GPU power draw.")
- Results summary: "You chose wisely! This system supports multitasking and high data throughput."

Learning Outcomes:

- Integrate **theory with practical configuration**.
- Make cost-performance tradeoffs.
- Appreciate **hardware-software synergy** (McLuhan: "The hardware shapes the software environment").

Summary: Interactive Strategy Alignment

Tool	**Focus**	**Learning Competency Developed**
Virtual Disassembly Lab	Identification, location, function	Hardware literacy, systems integration
CPU Performance Tuner	Clock speed, cores, heat, architecture	Processor fluency, optimization insight
System Builder Challenge	Decision-making, specification	Real-world application, cost-performance balancing
Embedded Wordwall Activities	Vocabulary reinforcement	Recall, matching, technical language fluency