Kolb's learning cycle story on 3D NAND memory:

1. Concrete Experience (What happened?)
While researching advanced storage technologies for my project, I came across the term *3D NAND memory*. Initially, I thought it was just a marketing buzzword for faster SSDs. But when I read deeper, I discovered that unlike traditional planar NAND, 3D NAND stacks multiple layers of memory cells vertically, like a skyscraper. I watched animations, read articles, and even examined diagrams showing the difference between 2D and 3D structures. The concept fascinated me—especially the idea that we can pack more memory in the same physical space by going vertical.

2. Reflective Observation (What did you notice?)
I noticed that 3D NAND isn't just about stacking layers—it solves a real limitation of 2D NAND, where shrinking cell size caused interference and reliability issues. I also observed that companies use different layer counts (64, 96, 176 layers, etc.), which impacts storage density, speed, and cost. Interestingly, the technology relies on innovations in fabrication, like etching ultra-deep holes for vertical channels. It made me realize how much engineering effort is hidden inside something as "simple" as a USB drive or SSD.

3. Abstract Conceptualization (What did you learn?)
I learned that 3D NAND memory represents a paradigm shift in storage design. Instead of endlessly shrinking transistors in a single plane, engineers decided to build upward—similar to how cities build skyscrapers when they run out of land. This approach increases capacity, improves endurance, and reduces cost per bit. I also connected this to broader concepts in technology: sometimes, scaling forward isn't about making things smaller, but about changing the architecture entirely.

4. Active Experimentation (What will you do next?)
Next, I plan to dive deeper into how 3D NAND fabrication works—especially techniques like *Charge Trap Flash (CTF)*and *Through-Silicon Via (TSV)* interconnects. I want to explore how this technology impacts performance in real devices by comparing SSD benchmarks using different NAND generations. I'm also considering integrating this knowledge into a small teaching module for my students, using 3D models to explain vertical stacking in a tangible way.