AI-Driven Digitally Immersed Learning for the Future of Supply Chain Innovation

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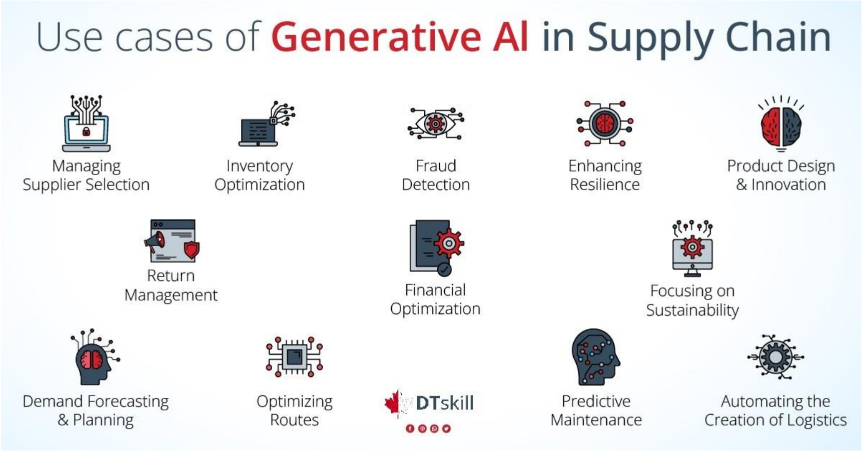
Imagine the Future of Supply Chain Learning...

- AI is transforming supply chains. But are we preparing students for this reality?
- The future of supply chain leadership belongs to those who can harness AI effectively.

The Problem: Education is facing a rapid evolution



https://www.linkedin.com/pulse/use-cases-generative-ai-supply-chain-dtskill/

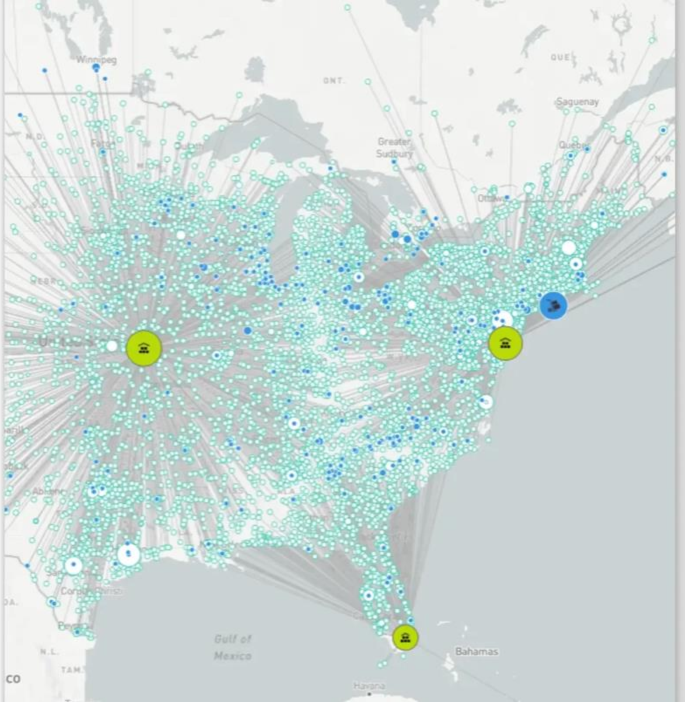
- Industry now runs on AI
- Without AI-driven learning, we risk a skills gap.
- Students must learn using real-world AI tools, not just theory.

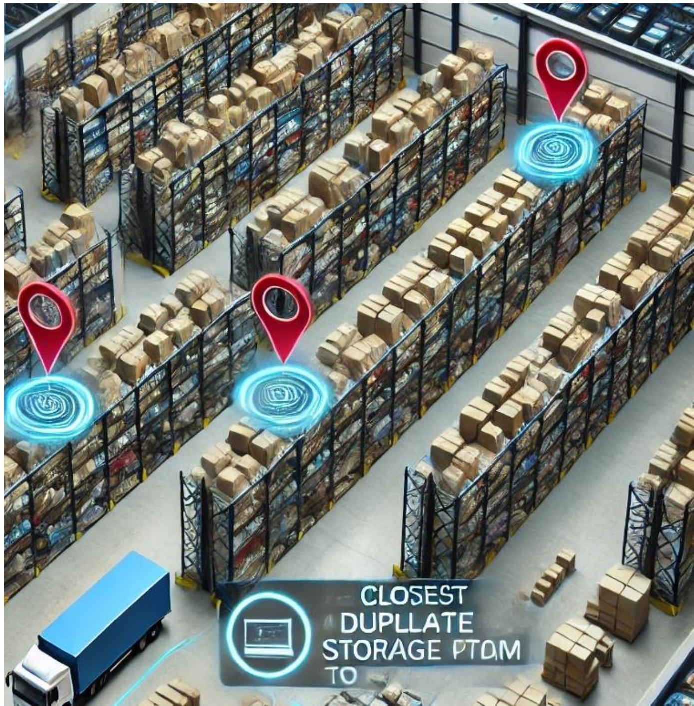
The Solution: AI-Driven Learning

- 🔷 AI-Generated Video Lectures
- 🔷 Augmented Reality & Digital Twins for hands-on learning
- 🔷 AI-powered Logistics & Transportation Modeling

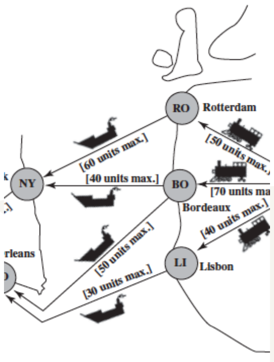
What We’ve Achieved So Far

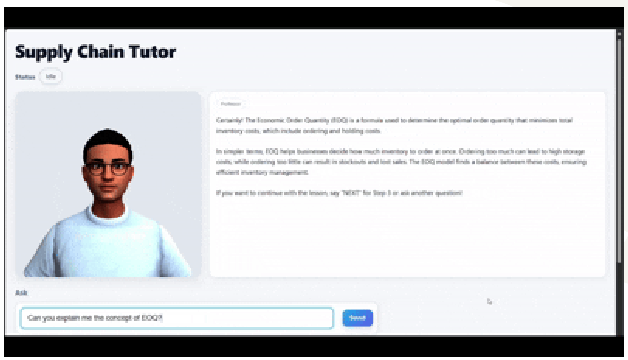
- ✅ AI-driven courses in Supply Chain Innovation
- ✅ AI-driven Digital (cartoon-like) Avatar pilot in Supply Chain Management
- ✅ Successful industry and investor engagement for deploying AI-Tutor/lectures

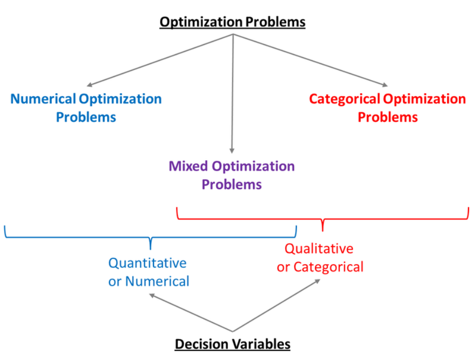




Example: Scenario 1 – Building a mathematical constraint for Sustainable Transportation – FLOW CONSERVATION







- Showing only how to build one constraint in this example. Understanding that we have decision variables:
  - Container Flow Quantity Variable
  - Binary Movement Activation Variable
  - Intermodal Transfer Activation Variable
  - Dwell Time Variable
  - Tank-to-Wheel Emissions Variable
  - Exogenous Flow Parameter (Treated as a Variable in Constraint)
- We also have the parameters (known values) for building the proposed equation:
  - Distance Between Nodes by Mode
  - Travel Time Between Nodes by Mode
  - Tank-to-Wheel Emission Factor
  - Transport Cost Per Arc by Mode and Container Type
  - Maximum Arc Capacity by Mode and Time
  - Container Weight by Type
  - Carbon Price Per Unit Emission by Container Type
  - Transfer Cost at Intermodal Nodes
  - Dwell Cost by Node, Time, and Container Type

Output – Flow conservation constraint

Flow conservation (with dwell) — for all $i \in N,\ k \in K,\ \tau \in T$

$$\underbrace{y_{ik,\tau-1}}_{\text{inventory carried in}} + \underbrace{\sum_{(j,m,t,k)\in\Omega_{\text{in}}(i,\tau)} x_{jimkt}}_{\text{flows that arrive now}} + \underbrace{q_{ik\tau}}_{\text{exogenous net supply } (+) \text{ or demand } (-)} = \underbrace{y_{ik\tau}}_{\text{inventory carried out}} \text{(FC)} + \underbrace{\sum_{(i,j,m)\in A} x_{ijmk\tau}}_{\text{departures now}}.$$

Explanation (why each term is here)

- **Left side = what's available now at (i, τ):**
  (i) containers you had at the end of last period, $y_{ik,\tau-1}$;
  (ii) containers that **physically arrive** at time τ after traveling their mode-specific Δ;
  (iii) any external injections/withdrawals, $q_{ik\tau}$ (positive adds supply; negative removes to meet demand).
- **Right side = where it goes now:**
  (i) you may keep some to the next tick as end-of-period inventory $y_{ik\tau}$ (this is your **dwell**);
  (ii) you may **depart** some on outgoing arcs at the current time τ.

This equality enforces—**for each node, hour, and container type**—that outbound and inbound flows (plus inventory dynamics) are perfectly balanced with any exogenous supply/demand. It guarantees (1) valid movement history, (2) supply/demand respect at each node-time, (3) no disappearance/duplication of containers, and (4) a physically traceable solution.

Watch the AI interaction that helped create this equation **here**.

Join Us in Transforming Supply Chain Education!

- We are shaping the future of AI-driven learning.
- Let's make AI-driven learning a defining strength of SDSU.
- Let's build a world-class AI-driven learning experience that prepares students for tomorrow's supply chain industry—today!

Thank you!