★ YEAR 2 | 2026

From Concept to Action:

Operationalizing Artificial Intelligence: Scaffolding and Executing AI-Driven Pedagogical Frameworks

Year 1: Ideas for introducing AI into the classroom – scaffolding roadmap.
Year 2: Execution and lessons learned – AI assignment implemented.

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The journey from concept to application

2025 | YEAR 1 — The Roadmap

The case for why AI demands a new teaching approach

A methodology roadmap: pilot, explore, iterate — incrementally

A challenge to us: apply the method

Theory. Framework. Ideas

2026 | YEAR 2 — The Application

Take the challenge – Design and implement AI assignment to expand learning

No technology impediments, No course overhaul!

Retrofit with existing concepts – this worked and faster than expected.

Real student application, real errors, real learning

Action. Evidence. What to steal.

I'll share my approach to retrofitting and enhancing metacognition with an AI assignment

The barrier to getting started is almost zero.

No hardware

Students used their own laptops and browsers — nothing to install

No IT support needed

ChatGPT, Claude, Gemini — free tools students accessed immediately

No rebuilt course

I took ONE existing assignment and added an AI comparison layer

No extensive Prompt Training

Students figured out basic prompting with minimal guidance – 20 min. lecture

No prerequisite AI skills

A foundations-level sophomore course. Zero prior AI experience required

Retrofitting AI concepts with an existing assignment was new work for me

What You'll Walk Away With Today

1

The Retrofit Story

How I took an existing assignment and added an AI layer in one semester — and what I wish I'd known first.

2

The Starbucks AI Lab

A live look inside the assignment: what students did, what AI got wrong, and how judgment became the grade.

3

What Students Actually Did

Real prompt logs, real errors, real growth — the messy middle you don't see in polished case studies.

4

How You Can Start Tuesday

A five-step retrofit framework — applicable to any discipline, any existing assignment.

This is a peer-to-peer session. If something resonates, steal it.

Your students are already using AI.

The question is no longer IF — it's whether they're doing it WELL.

100M

users in 60 days

ChatGPT — fastest product adoption in history

3 yrs

from launch to daily use

AI is now standard in most professional environments

∞

pace of capability growth

What took 20 prompts last year may take 2 today

Teaching only pre-AI skills leaves students under-prepared for a workforce that has already moved on.

Ignoring AI and blindly trusting it are equally dangerous

The Risk of Ignoring AI

- Students enter the workforce lacking formal AI skills and context
- Traditional manual skills lose relevance quickly without AI pairing
- Students are already using AI — with or without your guidance
- Greater competition from graduates trained at AI-forward programs

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The Risk of Unchecked AI

- AI hallucinations produce plausible-sounding errors students accept
- Students may outsource thinking entirely — **"Thinking Atrophy"**
- Foundational skills still required to validate AI output
- Accountability and judgment cannot be delegated to a tool

The answer is neither extreme — use AI and focus students on evaluating outcomes (metacognition not AI magic)

The Conceptual Framework - HITL: Human-in-the-Loop

The three-step principle that made the Starbucks Lab work.

01 Human Sets the Goal

Define the task, ask the right question, set quality criteria. AI cannot know what 'good' looks like without human direction.

02 AI Does the Heavy Lifting

AI handles repetitive, labor-intensive tasks: cleaning, computing, formatting. Saves hours — but errors are possible.

03 Human Validates & Owns Results

Compare, verify, correct. The human analyst is fully accountable for accuracy, completeness, and conclusions.

★ **Students are graded on judgment, validation, and understanding — not on what AI produced.**

The Retrofit — One Assignment. Two Versions. One Major Discovery.

The Baseline Assignment - Manual

- Apply data analytics concepts to real Starbucks nutrition data
- Clean data manually using Power Query in Excel
- Compute central tendency: means, medians, ranges
- Create visualizations: box plots, scatter plots
- Demonstrate getting correct results - reflect on what the data reveals (metacognition anchoring theory to practice)

→ Added one layer

The retrofit – New AI Assignment

- Same Starbucks data. New learning objectives.
- Part 1: Use the results from original assignment
- Part 2: Develop prompts for AI to deliver the outcomes
- Part 3: Evaluate AI outcomes to original (manual) results. What matched? What differed? Why?
- Reflect: Where did AI help? Where did it fail? What is your judgment of AI and its capabilities?

Outcome was students evaluating AI and its performance, the "correct" answer was known from the baseline

Enhanced learning from reflecting and judging results from AI

The Starbucks AI Lab
A Three-Part Assignment in Action

Lecture + Hands-On | Real Data | Real AI | Real Judgment

Background and Context — Why This Course, Why This Assignment

The Course

- ANLY2300 — Intro to Data Analytics
- No prerequisites — targets Sophomores from any college seeking a Minor in Data Analytics
- Cannot assume prior knowledge of data, technology, stats, or visualizations

The Problem We Saw

- Key skills being automated — hiring manager expectations are shifting rapidly
- 60–70% of staff time currently spent on data cleaning — AI is automating this
- The skills employers need are changing faster than we can update syllabi

The Design Challenge

- How do you design an assignment that uses AI in the scope of today's environment?
- Teach the skill manually first using existing capabilities (Power Query, Excel)
- Then run the same assignment using AI — and have students compare the results

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Students complete three AI tasks — then compare every output to their own manual work

HITL Principle: Students validate every AI output against prior manual work. The comparison IS the assignment.

Part 1

AI-Assisted Data Cleaning

Prompt AI to clean the same Starbucks CSV they already cleaned manually in Power Query — fix text errors, handle nulls, standardize formats.

Part 2

AI Data Modeling (Central Tendency)

Prompt AI to compute the same means, medians, min/max they already calculated manually — then compare results for accuracy.

Part 3

AI Visualization Generation

Prompt AI to create a box plot and scatter plot, then evaluate: Are labels right? Colors appropriate? Story accurate?

Part 1 — Use AI to clean data and evaluate the outcome

What Students Prompt AI to Do

1. Fix corrupted/misspelled text (e.g., 'CCCofee', 'Soymikl')
2. Replace null/missing numeric values with column average
3. Standardize column names — spaces to underscores
4. Remove duplicate rows
5. Ensure correct data types for each column

Learning Outcomes

- Experience iterative prompt refinement (up to 20 attempts)
- Document every prompt in a log table
- Compare AI output to their Power Query result
- Identify where AI succeeded and where it missed
- Build foundation for HITL comparison

Rubic Focus: How well did the results from AI data cleaning reflect your expectations? What is your overall assessment of AI data cleaning quality - instances where corrections or decisions were needed and explain your reasoning.

Part 2 — Ask AI to apply statistical models and evaluate the results

Students prompt AI to compute the same descriptive statistics they already calculated in Excel — then formally compare every result.

Avg	Mean Calories
Med	Median Caffeine
Rng	Sugar Range
Max	Max Total Fat
Min	Min Protein (nonzero)
Avg	Avg Sodium

Rubric Focus: Did the results from AI data modeling reflect your expectations based on the prompt(s)?
Where there any errors and differences between your expectations and results?
What is your overall assessment of AI data modeling quality – were the answers from AI the same as your manual results? If there were differences, why might differences occur?

Part 3 — Have AI generate visualizations and review the outcome

Box Plot — Total Carbohydrates

Students prompt AI to generate a box plot showing distribution of carbs across all beverages. They evaluate: proper quartiles? Axis labels? Outliers identified correctly?

Scatter Plot — Calories vs. Sugars

AI generates a scatter plot. Students validate: correct variables mapped? Correlation visible? Title, legend, and colors appropriate for a professional report?

Student Evaluation Criteria — Applied to Every AI-Generated Chart

- ✓ Are axis labels accurate and meaningful?
- ✓ Are scales and ranges correct?
- ✓ Are colors appropriate — clear, not distracting?
- ✓ Score the quality 1–10 and justify in writing
- ✓ Does the chart type fit the data story?

Part 4 — Evaluate AI capabilities overall – the real learning

What did you learn about AI and its capabilities

Summarize what you learned about AI and data analytics. Did AI deliver the desired outcomes

How might AI impact you in the future

How you would explain this process to a future employer as evidence of your ability to use AI tools responsibly and effectively

Students reflected on the AI experience and application for the future

- Leverage the baseline learning to drive comparison and metacognition learning of AI capabilities
- This is the gold – embrace AI and highlight its application and current limitations

The comparison sheet — not the AI output — is the assignment

Where the real learning happens

Step 1	Step 2	Step 3	Step 4
Prepare	**Compare**	**Highlight**	**Reflect**
Two Excel tabs: Manual_Cleaned (Power Query) and AI_Cleaned (AI output). Same structure.	IF() formula: =IF(Manual!A2=AI!A2, "Match", "Different") across all rows and columns.	Conditional formatting marks all "Different" cells in red — a visual map of AI accuracy.	Students write: What did AI get right? What did it miss? What judgment was required?

★ **This models the professional analyst workflow — use AI, but OWN the outcome.**

AI errors become your most powerful teaching moments

I intentionally do not rescue students when AI outputs are clearly wrong on the first try.

Step 1: Diagnose

What exactly went wrong?
Missing columns, mis-typed measure, wrong chart type, AI reverting to Markdown instead of CSV, hallucinated column names.

Step 2: Revise

How should I change my prompt to fix it?
Iterate on Role–Context–Task–Rules–Output. Each revision is a hypothesis. Testing it is the experiment.

AI is a fallible collaborator, not an answer key.

Foundational skills in statistics and Excel still matter — without them, students cannot tell when AI fails.

Strong prompt logs prove students are thinking, not just typing

Prompt #	Expected Result	Actual Result	Fix / Next Step
01	"AI will return a CSV with corrected 'Beverage' text and no nulls in numeric columns."	AI gave Markdown table, not CSV; missing 'Caffeine (mg)' column.	Updated prompt to request CSV only, all 19 original columns explicit.
02	"AI will correct all 5 misspelling variants identified in manual cleaning."	AI fixed 3 of 5 variants — 'Soymikl' and 'CCCofee' still present in output.	Added explicit list of all misspelling variants with correct versions in prompt.
03	"AI will return only a clean CSV — no explanation, no preamble, no code blocks."	AI returned clean CSV with all columns, all corrections applied correctly.	Match confirmed against Power Query baseline — 847 of 850 rows matched.

The log is graded on iteration quality, honest documentation, and clear fix reasoning — not whether AI eventually got it right.

Structured prompting (R-C-T-R-O) is a teachable, assessable workforce skill

R	Role	Set AI's expertise — "Act as a Senior Data Scientist analyzing nutrition data..."
C	Context	Give domain and data info — "Analyzing a Starbucks nutrition CSV with 850 rows and 19 columns..."
T	Task	Specific action — "Clean all text columns, fix misspellings, remove duplicates..."
R	Rules	Set constraints — "Replace nulls with column average, round to 2 decimal places..."
O	Output	Define the result — "Return only a clean CSV, no explanation text, preserve all 19 columns..."

This framework is portable across every discipline — and it shows up in job descriptions.

How to Retrofit Any Assignment

Not just data analytics — applicable across every discipline

How might we engage AI in different disciplines?
Add AI comparison layer to an existing assignment

Data Analytics	AI cleans data → student validates; AI models → student compares; AI visualizes → student critiques
Business Writing	AI drafts memo → student improves and justifies edits; prompt log as deliverable
Marketing	AI generates campaign copy → student evaluates brand fit, tone, ethics; A/B prompt comparison
Finance / Accounting	AI calculates ratios or forecasts → student verifies inputs, checks assumptions, explains variance
Any Course	'AI vs. My Answer' exercise: student answers first, then queries AI, then compares and reflects

The pattern is always the same: Do it manually → Do it with AI → Compare → Reflect. You already have the first step.

★ How to Retrofit — Five Steps to Your First AI-Integrated Assignment

Start with what you already teach. You're closer than you think.

Step 1: Pick One Existing Assignment

Find one task students already do manually — cleaning, calculating, writing a first draft, analyzing a case. You already own this content.

Step 2: Add the 'AI Version' Layer

Ask students to use AI to accomplish the same task. Let them explore ChatGPT, Claude, Gemini, Copilot. Don't mandate one tool.

Step 3: Build the Comparison Task

The deliverable is the comparison: what matched, what differed, what judgment was needed. Add a prompt log requirement.

Step 4: Add a Reflection Question

Ask: 'Where did AI help? Where did it fall short? What would you do differently next time?' Metacognition is the learning.

Step 5: Iterate Each Semester

AI tools change fast. What took 20 prompts last year may take 2 today — that evolution IS the next lesson. Plan to update.

Four assessment strategies that grade judgment, not just output

Require a Prompt Log

Students document every prompt attempt with expected vs. actual results. Graded on iteration quality, not just the final output.

Demand Comparison Work

Students always compare AI output to prior manual work. The difference analysis IS the deliverable — not the AI result.

Score the Reflection

Students write about where AI succeeded, where it failed, and what judgment was required. Metacognition is the learning.

Assess Validation Rigor

Did the student catch AI errors? Did they apply domain knowledge? This separates critical thinkers from button-pushers.

"You are graded on how you think with AI, not whether AI is perfect."

Your most common concerns already have practical answers

"Won't students just let AI do everything?"

The HITL framework requires students to compare and explain — they cannot skip the manual work because that manual work is the baseline for validation. No manual work = no comparison = no grade.

"What if AI is just wrong?"

That is the point. AI errors are teachable moments. Catching them requires exactly the foundational skills you already teach. Wrong AI output is not a problem — it is the assignment.

"I don't know enough about AI to teach it."

You don't need to be an AI expert. You are teaching skills and concepts you already know. AI is the subject of evaluation, not the teacher. You bring the domain knowledge that makes judgment possible.

"My discipline doesn't use AI yet."

Could be true — yet. Every discipline will be affected. The faculty who design thoughtful first approaches will shape how their field handles AI. That could be you.

Three things to take back to your classroom — grounded in what actually happened

1

The retrofit is real — you don't need to rebuild anything

I took one existing assignment, added an AI layer, and ran it in a sophomore course with zero prerequisites. No new hardware. No IT support. Students figured it out. If I can do this, you can do this.

2

Students rise to the challenge when comparison IS the assignment

The 'why do I have to do this twice?' frustration transforms into analytical thinking the moment they see a red 'Different' cell and must explain why. That explanation is the entire point.

3

Start with what you already teach — add the mirror

You do not need a new course, a new textbook, or a new skill set. Find one manual task your students already do. Ask AI to do the same thing. Make the comparison the deliverable. That is the whole strategy.

Let's Discuss

What’s are you curious about?

How can I help?