**A) Data Science PBL Example**

**1) Framing with the Big Idea (Part of Weeks 1-3)**  
During the first Lab session, I introduce students to the Big Idea task, which involves making a case for understanding the business domain before starting a project (*see the email-attached Lab 1 Exercise Excerpt document*). Students articulate:

*- The problem or puzzle:* What is the central issue or question the data can help explore?

- *The stakeholders:* Who cares about this analysis (e.g., companies, consumers, policymakers)?

*- The story or contribution:* What insight or message should be communicated from the data?

*- The action requested:* What decisions, changes, or strategies might follow from the analysis?

This forces students to think about **context, domain expertise, and purpose** before they even touch tools (*In the same activity, they are later introduced to visualization with spreadsheets to visualize just the big idea relevant to the key audience – omitted for brevity).*

1. **Connecting to Exploratory Data Analysis (EDA)**  
   Once grounded in the Big Idea, students practice **EDA fundamentals** (cleaning, descriptive statistics, visualization). They learn that EDA is not just technical — it is how one uncovers the patterns that will drive the story they want to tell.

For example, when given **video game sales data across regions**, students use descriptive statistics and visualization to explore market differences. Their Big Idea guides their choices: *Is the story about regional preferences, the dominance of certain platforms, or changes over time?*

This exercise blends **technical skill** (computing descriptive statistics, plotting) with **communication skill** (telling a story about what the results mean for stakeholders).

1. **Introducing Pivot and Launch Component to the Example**

I use a **Big Idea worksheet** at the very start of the course to push students beyond “just running code.” It requires them to articulate: the problem/puzzle, the primary stakeholders, the core message or contribution their analysis will make, and the concrete action they will recommend. We practice this with short, realistic scenarios so students experience the *why* before the *how*. For example, in **Lab 1** students complete a Big Idea for a pet-adoption campaign scenario and then critique a colleague’s flu-vaccine Big Idea—this sets the tone that data work must be audience- and decision-oriented, not tool-oriented.

This framing is the **Pivot** in my Pivot-and-Launch approach:

* **Pivot** = ground students in core concepts of *problem framing, stakeholders, claims, and calls to action*.
* **Launch** = apply those anchors to progressively richer, more ambiguous data contexts (first a common dataset, then self-chosen data).

**B) Enhanced: The scaffolded PBL sequence with Pivot-N-Launch Application**

**Phase A — Pivot (Weeks 1–3): Big Idea and feedback studio**

* **Activity:** Students in respective groups complete the Big Idea worksheet on a short scenario; peer groups give structured feedback on clarity, stakeholder relevance, and actionability.
* **Skill focus:** Framing decisions, defining success, anticipating evidence needs, and practicing audience-appropriate language.
* **Outcome:** A one-sentence Big Idea that becomes the reference point for all analyses in the module.

**Phase B — Launch 1 (Weeks 3–6): Video-game market group project (mid-term)**

* **Dataset:** Worldwide video-game sales across regions.
* **Deliverable:** A **10–12 minute group video presentation** (all members speak) that reports exploratory analyses and findings to a clearly defined stakeholder.
* **Guiding prompts (excerpt) from the mid-term task brief I give to my student:**
  1. What questions can this data answer (e.g., region/genre/platform trends; time-series patterns)?
  2. What data do we *not* have—what limits interpretation?
  3. Inconsistencies/missingness and how you handled them.
  4. Descriptive stats: means, medians, dispersion, distributions, correlations; show and explain.
  5. Visual EDA → hypotheses worth testing.
  6. Feature engineering that improves signal (e.g., lifecycle buckets, region shares).
* **How the Big Idea helps:** Teams must open by restating their Big Idea (problem, stakeholder, story, action). That anchor curates the EDA: they select relevant variables, visuals, justify data transformations, and conclude with an actionable recommendation that feeds into **explanatory data analysis** (e.g., portfolio emphasis by sales region/game genre/platform type).

**Phase C — Launch 2 (Weeks 6–10): Student-selected data stories**

* **Student choice:** Teams select their own dataset and repeat the same Big-Idea → EDA → Story → Action workflow.
* **Reason:** This expands domain understanding and tests transfer of the Pivot across a new context.
* **Tools:** I introduce tooling **as needed** (e.g., spreadsheets → Python/pandas programming → SQL for data analysis → visualization packages). Students *feel* the need for the tool because the story they want to tell demands it.

**3) Where Pivot–and–Launch shows up in the work (Only Exploratory Data Analysis)**

| **PNL element** | **What students do** | **Evidence produced** |
| --- | --- | --- |
| **Pivot: Core anchors** | Big Idea worksheet + feedback pass | One-page problem–stakeholder–story–action sheet (used in all check-ins) |
| **Load-aware EDA** | Clean, profile, and summarize; visualize distributions/relationships | Short EDA brief with descriptive stats, missingness handling, and data limits |
| **Launch: Contextual application** | Apply the Pivot to video-game data, then a self-chosen dataset | Video presentation (10–12 min); public-facing slide deck with stakeholder-ready narrative |
| **Critique & iteration** | Peer reviews based on given rubric (clarity, correctness, actionability) | Revision notes; updated visuals and tighter claims |
| **Action** | Make a clear recommendation tied to stakeholder needs | Final slide: *what to do next and why* (incl. risks/assumptions) |

**4) Assessment (how I grade PBL artifacts in the Big Idea & EDA which has 35% weighting of the total project grade,** Explanatory is **45%** and Presentationis **20%)**

* **Framing (Big Idea):** Problem clarity, stakeholder specificity, claim/action alignment (10%).
* **Exploratory Data Analysis (EDA) quality:** Data understanding (types, scope), descriptive statistics correctness, missingness strategy, and integrity of comparisons (25%).
* **Visual storytelling:** Choice of charts, labeling, and how visuals support the narrative (20%).
* **Reasoning & hypotheses:** Plausible hypotheses, feature engineering rationale, and honest limits of inference (20%).
* **Recommendation:** Stakeholder-relevant action with assumptions/risks noted (15%).
* **Team communication:** Equal participation; professional structure; time discipline (10%).

**5) Midterm deliverables:**

* A **stakeholder-anchored story** (Big Idea) that frames the market question (e.g., “Which genre–platform combos should a publisher prioritize in the European region next year, and why?”).
* **Exploratory analysis** that is readable to non-technical audiences: clean tables, diagnostic and distribution plots, simple correlation views, and two or three engineered features that actually add insight.
* **Explanatory analysis** that reduces cognitive burden on the interested stakeholders or audience and elicits desired actions based on exploratory findings. A decision-ready action and a short “what would we need next” slide that acknowledges data and context limits.
* **Professional group presentation**