**Case Study: Data Model Refinement & Peer Validation Boosts Learner Confidence in Grain and SCD Decisions**

**Background**

A mid-sized retail company embarked on designing their new data warehouse to analyze sales and customer behavior. The initial logical and physical data models were drafted by a team of junior data engineers and business analysts.

**Challenge**

* The initial Entity Relationship Diagrams (ERDs) and star schemas had inconsistencies:
  + Ambiguous grain definitions causing confusion in fact table design.
  + Mixed Slowly Changing Dimension (SCD) types applied inconsistently.
  + Missing surrogate keys in dimension tables.
  + Poor naming conventions and unclear relationships.
* Learners and model authors lacked confidence in their grain and SCD choices due to limited prior experience.
* Risk of flawed data integration and inaccurate analytics if these issues persisted.

**Approach**

**Step 1: Peer-Review Sessions**

* Organized structured peer-review workshops involving data architects, senior engineers, and business users.
* Used checklists focusing on grain definition, SCD classification, naming conventions, and relationship cardinality.
* Each learner presented their data model and rationale for grain and SCD decisions.
* Reviewers provided targeted feedback with examples and best practices.

**Step 2: Model Refinement**

* Learners revised ERDs and star schemas incorporating peer feedback.
* Grain was explicitly defined per fact table (e.g., “1 row per sales transaction line”).
* SCD types were standardized:
  + Dimensions storing changing customer attributes implemented as SCD Type 2 with surrogate keys, effective dates, and current flags.
  + Static dimensions retained as Type 0 or 1 as appropriate.
* Surrogate keys were added to all dimension tables.
* Naming conventions aligned with organizational standards.

**Step 3: Validation & Confidence Building**

* Post-refinement, models were peer-signed off as reviewed and fit for development.
* Learners engaged in practical mini-labs to reinforce grain and SCD implementation.
* Hands-on exercises helped solidify understanding and decision-making skills.

**Outcomes**

* **Improved Model Quality:**  
  Clean, consistent ERDs and star schemas with clear grain and SCD definitions.
* **Learner Confidence:**  
  Participants expressed greater certainty in their design choices and readiness to implement.
* **Stakeholder Alignment:**  
  Peer sign-off encouraged cross-team alignment and reduced rework downstream.
* **Foundation for Robust Analytics:**  
  Well-defined grain and accurate history tracking enabled reliable business intelligence reporting.

**Key Learnings**

* Peer review is invaluable in identifying hidden assumptions and errors early.
* Explicit grain definition is critical to consistent fact table design.
* Correct SCD type application prevents data corruption and supports historical analysis.
* Practical exercises reinforce theoretical knowledge and build confidence.

**Recommendations**

* Incorporate regular peer-review cycles during data model design phases.
* Use grain and SCD checklists as standard artifacts.
* Provide hands-on labs aligned with design theory for learner reinforcement.
* Document and maintain naming conventions and modeling standards.