

Collaboration Patterns in Nephrotex
Comparing High- and Low-Performing Teams Using ENA
2026 QE Data Challenge

Group 5

Presenter: Behdokht Kiafar

Group members: Atefeh Behboudi, Annie Zhou, Martin Kaehrle

Mentor: Yuanru Tan

Dataset: Team Discourse in Nephrotex

- Nephrotex is a virtual internship where students work in teams to design a biomedical device.
- The dataset includes:
 - Chat messages among team members
 - Team and student identifiers
 - Activity/room information
 - Outcome score and performance group
 - Coded discourse moves and justifications

Research Question

- How do high- and low-performing teams differ in the way they connect design reasoning, communication, questioning, testing, and decision-making during the Nephrotex virtual internship?

What the Raw Data Looks Like?

Column	Meaning
Content	Chat message
Uniqueuserid	Student ID
ChatGroup	Team ID
RoleName	Player or mentor
RoomName	Activity or task
Site_x	School/site

Coding Scheme

Code	Meaning
j_communication	Justifying design choices based on communication
j_consultants_requests	References to customer or consultant needs
j_performance_requirement	Discussion of performance requirements or design criteria
m_asking_questions	Asking questions or seeking clarification
m_making_design_choices	Making or proposing design decisions
m_experimental_testing	Testing, evaluating, or comparing design options
Design_Justification	Explaining or justifying a design choice

j-codes: reasoning/justification codes

m-codes: interaction/action codes

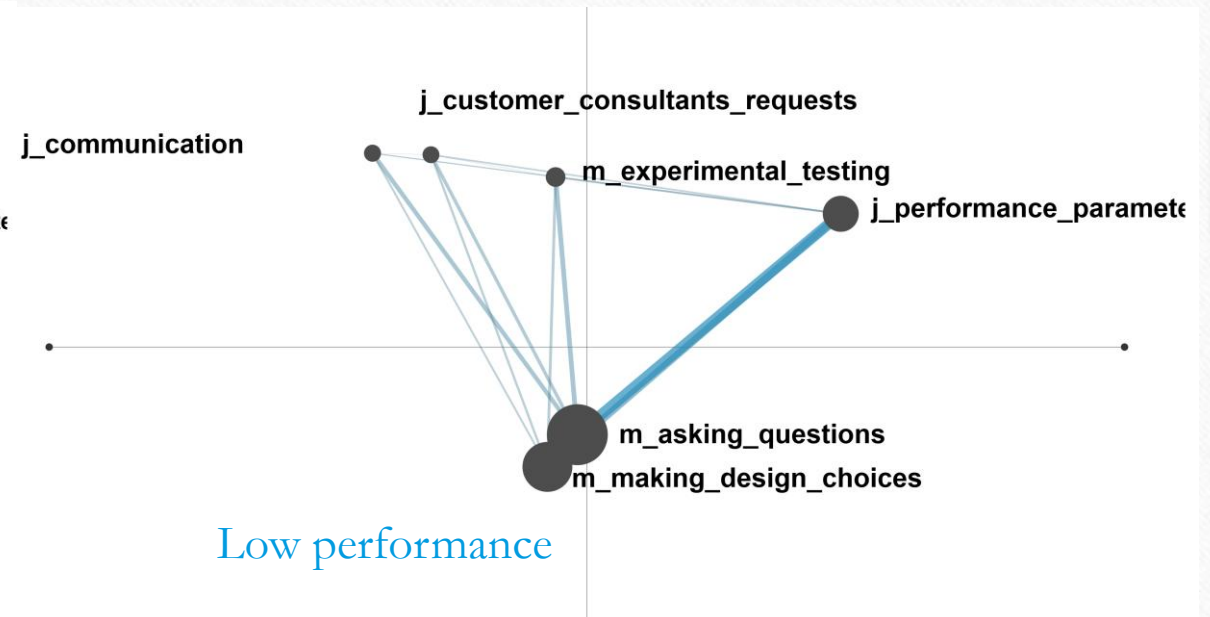
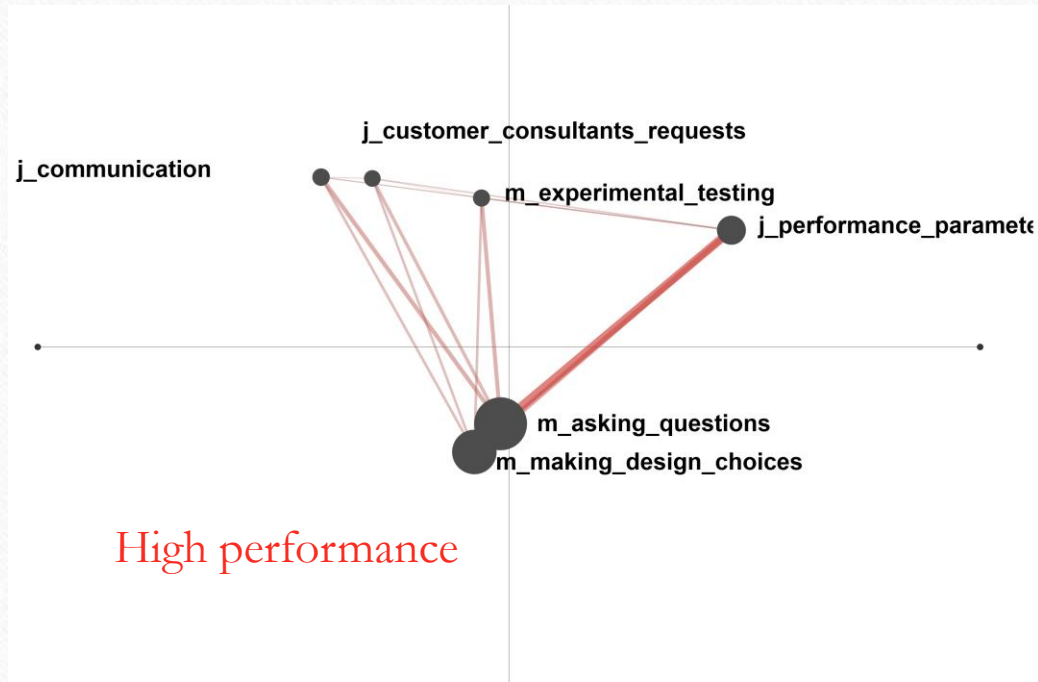
Grouping Variable

Column	Value
OutcomeBin	1 vs. 0
OutcomeBin_Char	high vs. low performance

ENA Model Setup

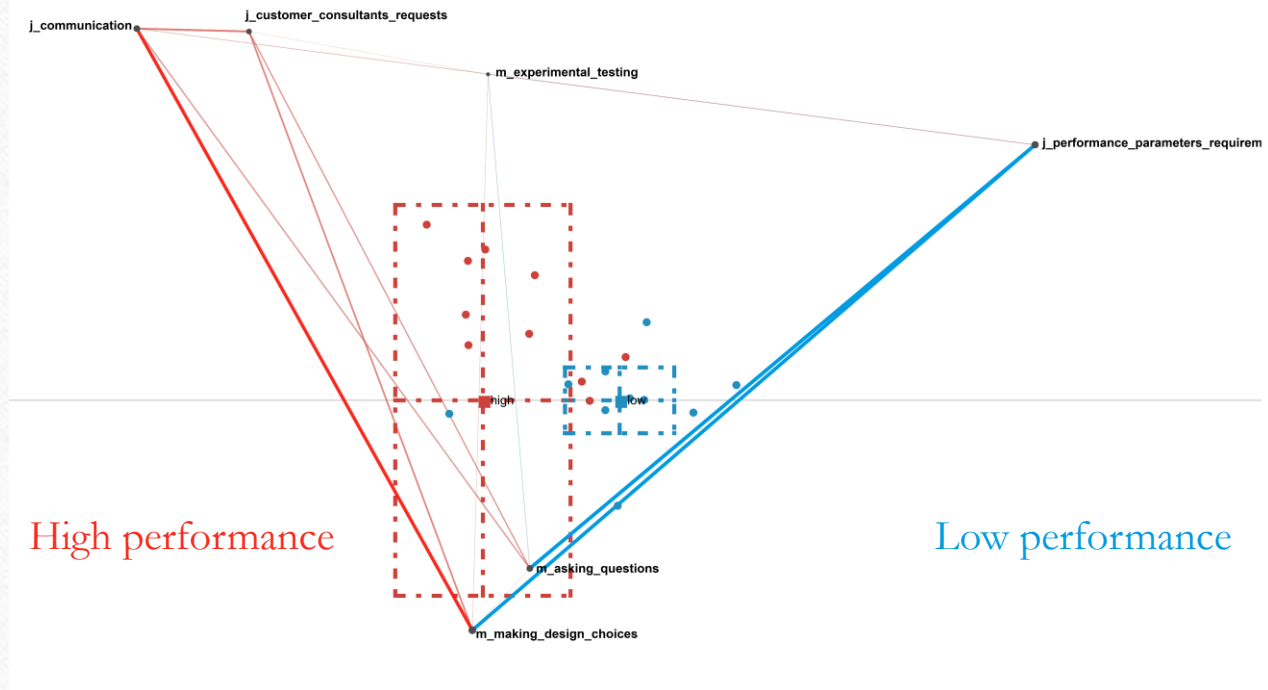
- Units: team-level cases
- Conversation: chat discourse within activity/task
- Comparison: high-performing vs. low-performing tasks of each team
- Codes: all codes of the codebook

ENA Networks: High vs. Low Performance Teams



Subtracted Network

- What Distinguishes High and Low Teams?
 - High-performing teams were more likely to connect communication and consultant/customer requests to design choices.
 - Low-performing teams were more likely to connect performance requirements to asking questions and design choices.



Main Finding

High-performing teams	Low-performing teams
Communication-centered	Question-centered
Consultant/customer input	Performance requirements
Design choices linked to collaboration	Design choices linked to task constraints
More collaborative reasoning	More procedural reasoning

Interpretation

- The high-performing teams may have used communication to connect external constraints and design decisions. This suggests a more integrated design process.
- The low-performing teams may have focused more on immediate questions and performance parameters. This suggests they were engaged in the task, but their discussion may have been less connected to broader collaborative reasoning.

Limitations

- ENA shows patterns of association, not causal relationships.
- More qualitative examples are needed to validate the network interpretation.
- The goal here is not to claim a final explanation, but to identify promising discourse patterns for deeper analysis.

Next Steps

- Check whether the same patterns appear across different rooms or activities
- Apply ordered network analysis (ONA) to study the flow of information
- Compare team-level patterns across outcome scores, not only binary high/low groups

Thank you!