

DATA-INFORMED GROUP FORMATION TO IMPROVE COLLABORATION



COURSE CONTEXT & DESIGN PROBLEM

Context	Graduate-level Seminar for Engineering Teaching Assistants(Hybrid)
Design Problem	Informal groups led to uneven participation, with some students dominating.
Instructional Solution	Implemented a data-driven group formation strategy using the Louvain community detection algorithm to support balanced, productive groups.
Key Impact	Participation became more evenly distributed. Discussions showed stronger reciprocity and less reliance on a single dominant voice.



[1] Collected early interaction data

Initial seminar discussions and activities to see who responded to whom, and how often

Built an interaction network



[2] Applied Louvain community detection

Identified natural clusters in the interaction network

Avoided isolating quieter students at the edges

Balanced more central and less central participants across groups



[3] Formed stable discussion/project groups

Used cluster results to assign groups for ongoing seminar tasks

Ensured each group had a mix of voices and experience levels

Reduced the risk of one person “carrying” the group



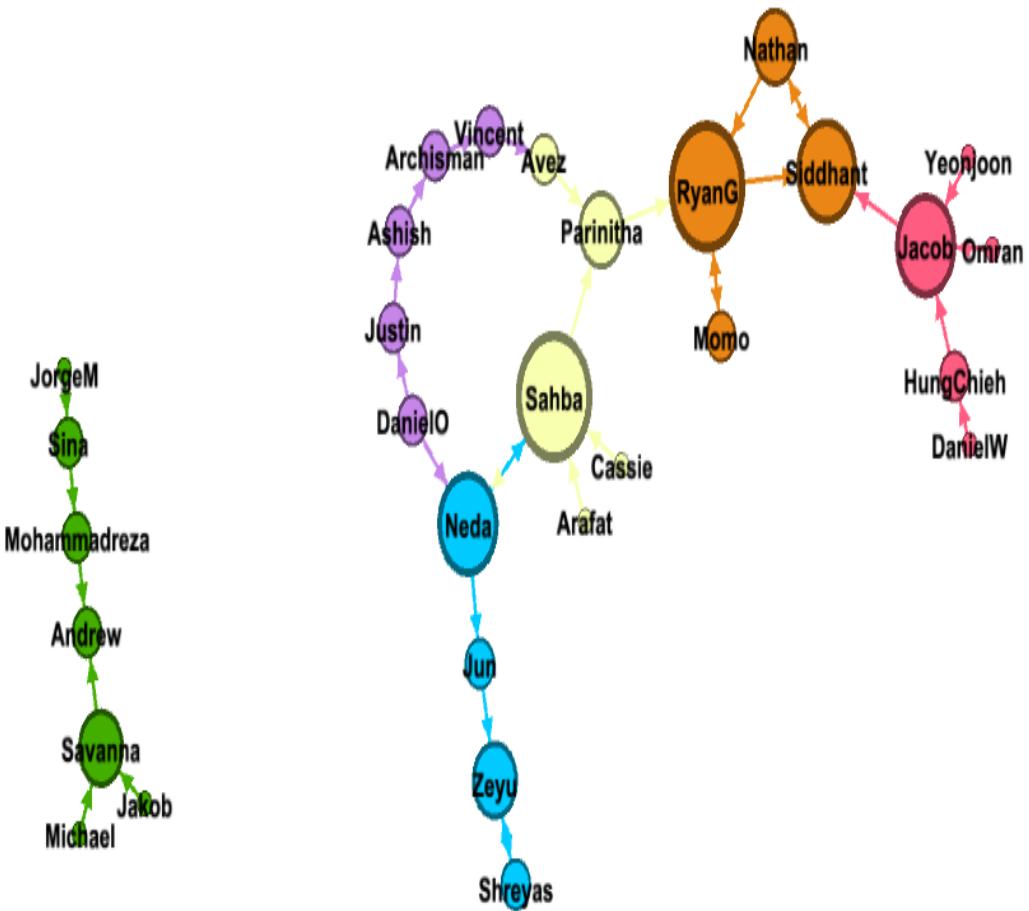
[4] Integrated into course flow

Announced final group assignments early in the semester

Groups stayed together for discussions, peer feedback, and mini-projects

Monitored collaboration patterns over time

IMPLEMENTATION IN THE COURSE



IMPACTS & REFINEMENTS

Observed Outcomes

- Group assignment lists informed by network data
- Before/after network views of group structure
- Brief instructor notes on how to use data-informed grouping in future offerings
- Participation became more evenly distributed across group members.
- Discussions showed stronger reciprocity, reducing reliance on a single dominant voice.
- Group work on teaching cases and activities was smoother and more sustained.
- Groups felt fair and purpose-driven rather than arbitrary.
- Less time was spent addressing group issues and reassessments.

Design Reflection & Iteration

- Combine network-based grouping with brief preference data (e.g., teaching interests, prior experience).
- Add a short orientation explaining why structured groups matter for their development as future instructors.
- Provide simple visual feedback to TAs about how their group is participating over time.
- Provided a **repeatable, data-informed grouping method** for future cohorts.