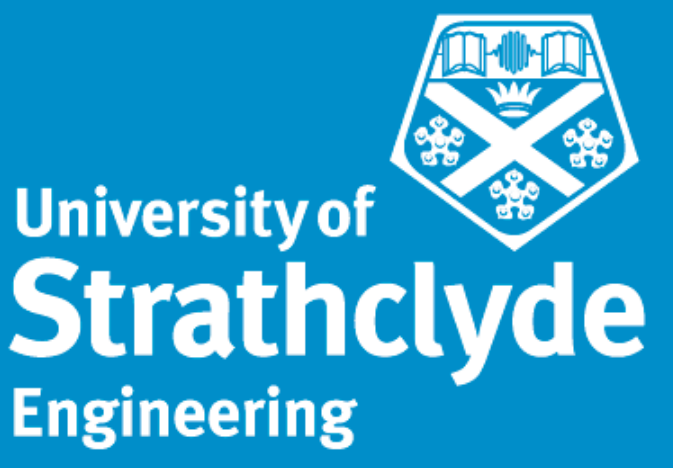


Tensions and Tactics: A Grounded Theory of Group Design Projects

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Why look at Design Projects (DPs)?

Graduate Employability Skills

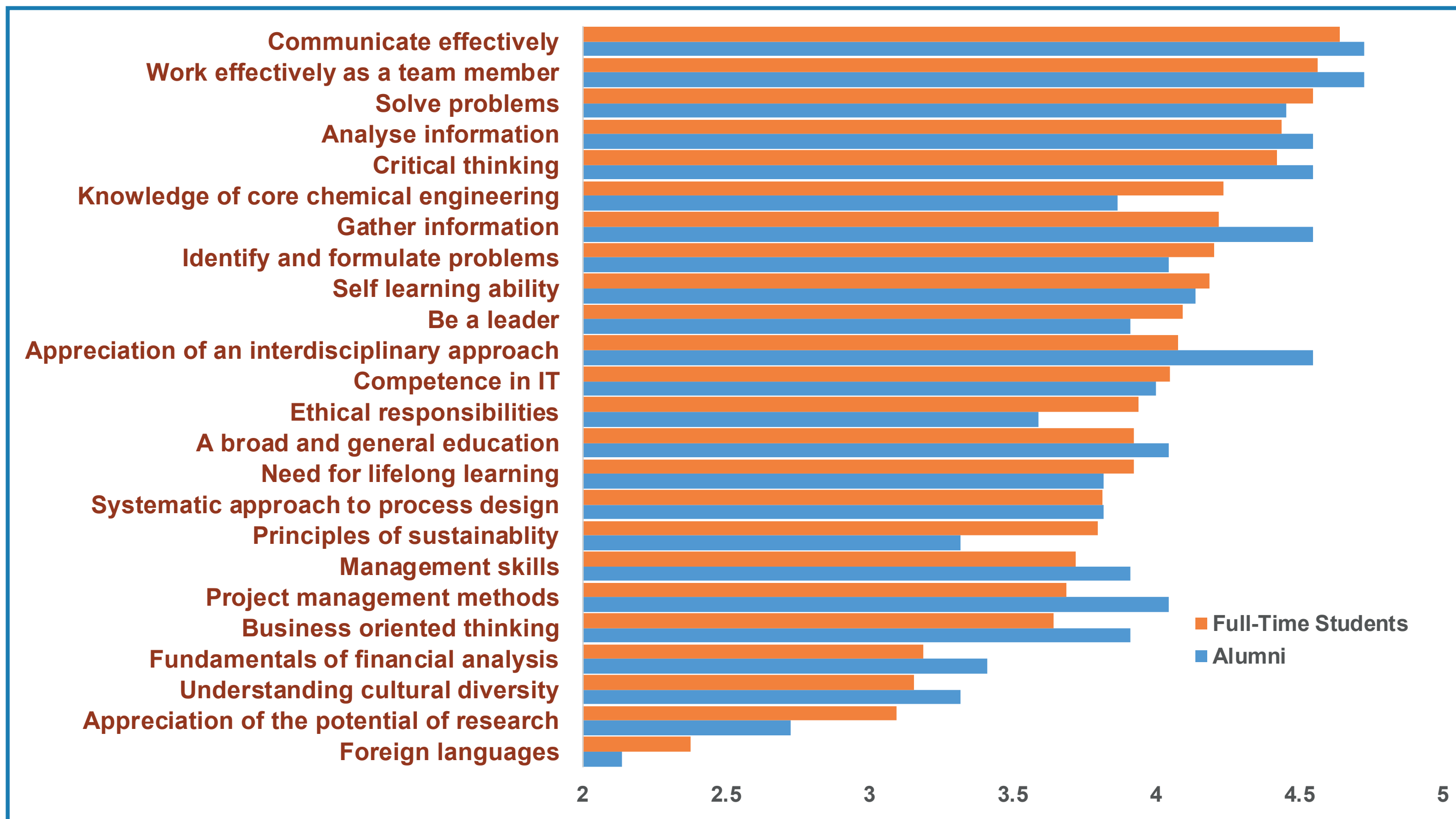


Fig 1. Average importance rating of skills (alumni and students) for work (Fletcher et al. 2016)

Final year Chemical Engineering (CE) students and alumni were surveyed by Fletcher et. al (2016) and asked to rate importance of skills for work. Amongst the most important skills were:

- communication
- teamwork
- problem solving
- information analysis

IChemE Grad skills & DP

IChemE, in their, guidelines (2017) give an outline of student development for CE DPs:

"... transferable skills such as **communication and team working**.

...**define a problem and identify constraints**, the employment of **creativity and innovation**...

... **critical powers** by requiring **choices and decisions to be made in areas of uncertainty**..."

IChemE foresee the **dichotomy** of delivering DPs, in that these:

"...should **simulate** so far as is reasonably possible **the real world**, whilst acknowledging the **constraints of the educational setting**..."

DP @ University of Strathclyde (UoS)

Pre-2015, the DP ran as two concurrent projects (conceptual and detailed). The 2015 3 phase DP is shown in Fig 2. In 2018, the 3rd phase was subsumed into the 2nd, thus becoming biphasic.

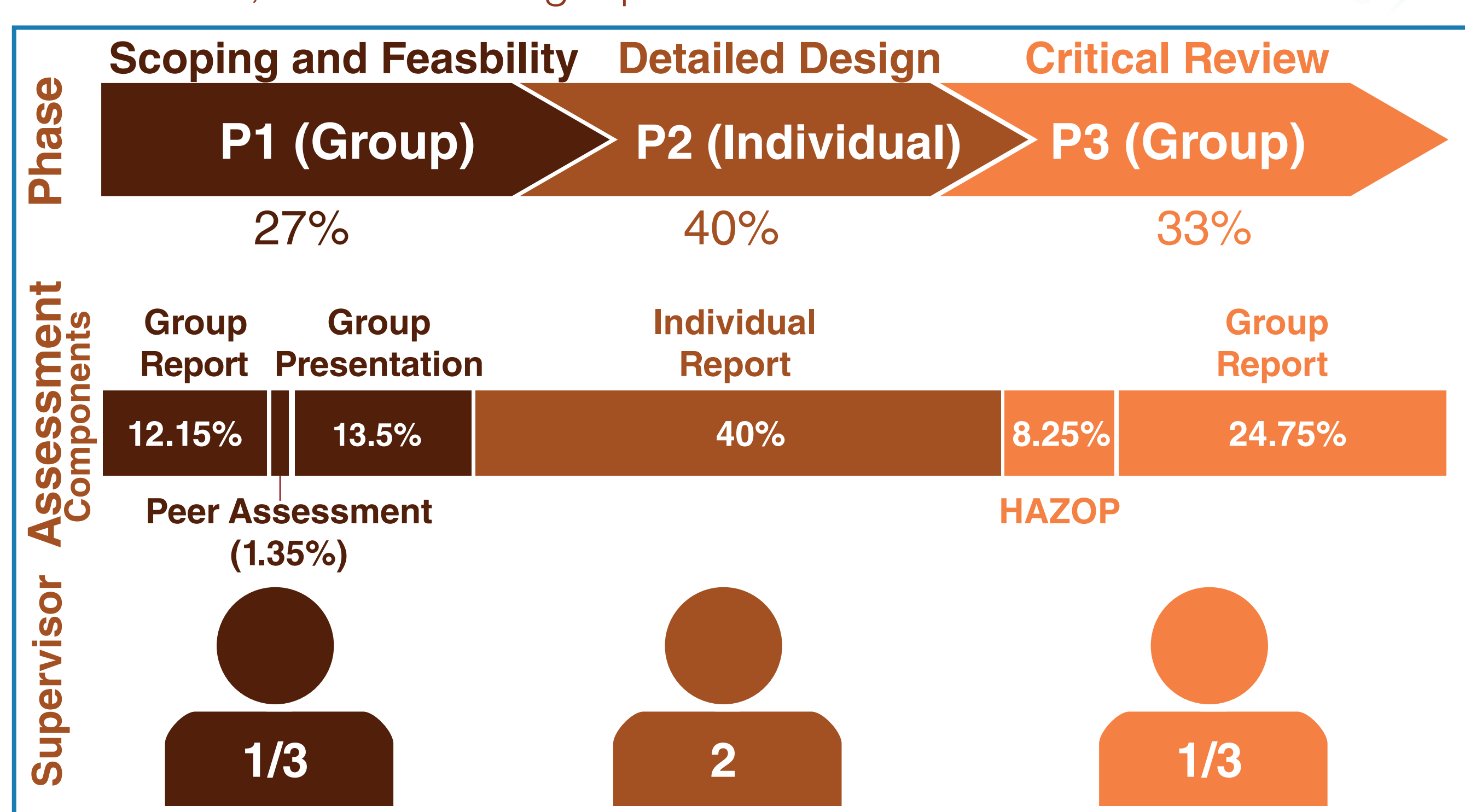
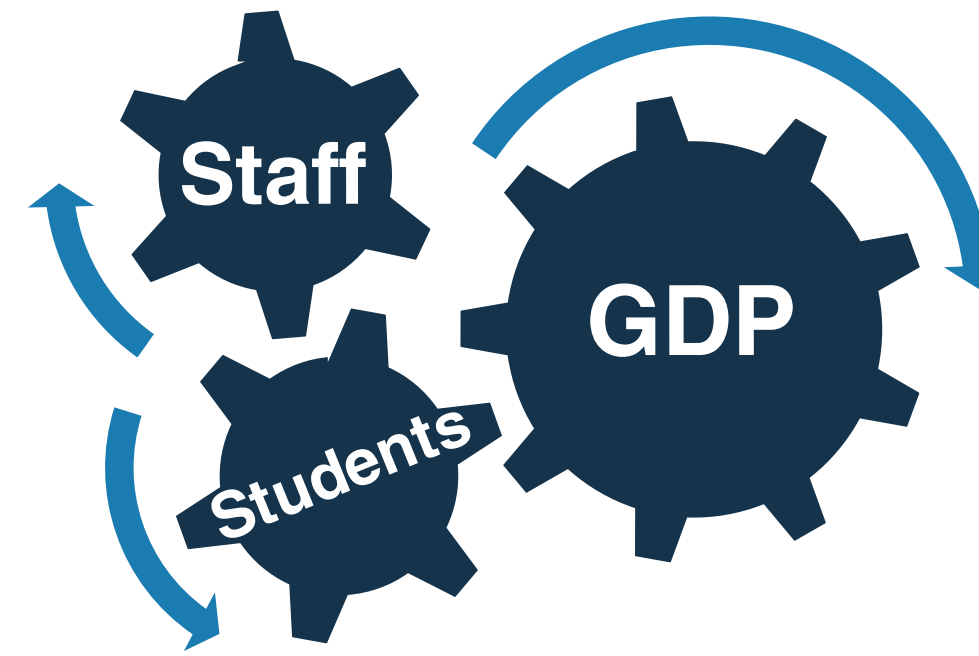


Fig 2. DP at University of Strathclyde's CE Department

How to study DPs? Grounded Theory (GT)

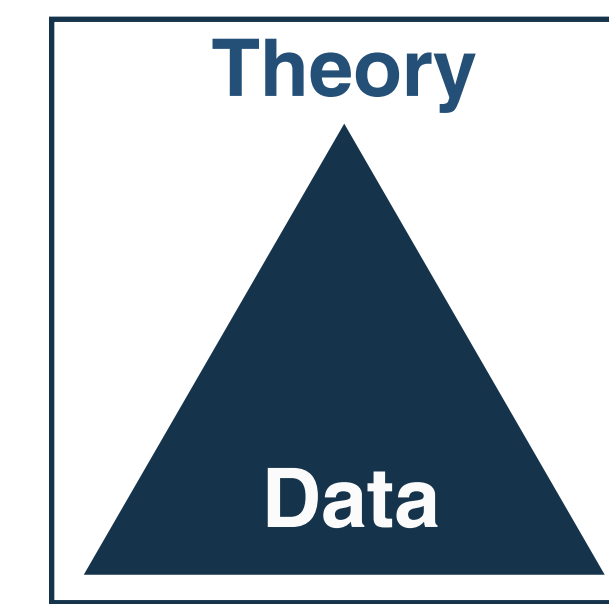
The DP at UoS undergoes significant change, hence the research method had to account for variability.

Grounded Theory (GT) is an **inductive** research method that thrives with variability (Glaser & Strauss, 1967).

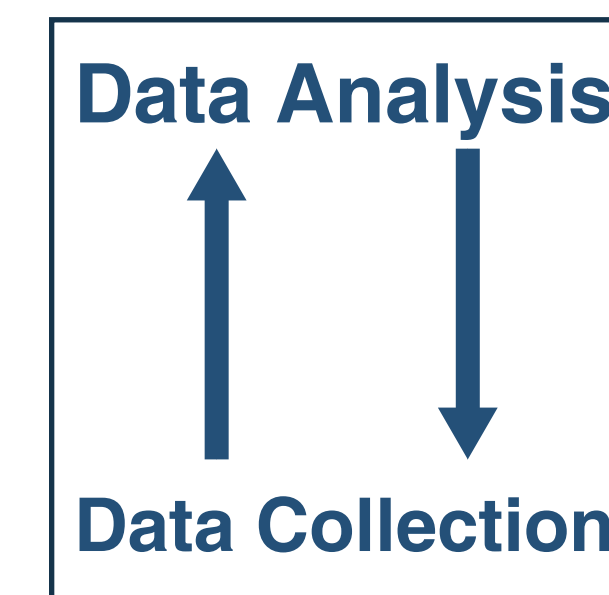


The **research questions** are

"What theory of **social process** explains the DP observations?"



Induce theory from data instead of deducing conclusions from preconceived theory and literature.



Data analysis and data collection take place **iteratively**, using theoretical sampling to direct data collection.



Constantly compare data with data to develop concepts. Compare data with concepts to develop concepts & categories.

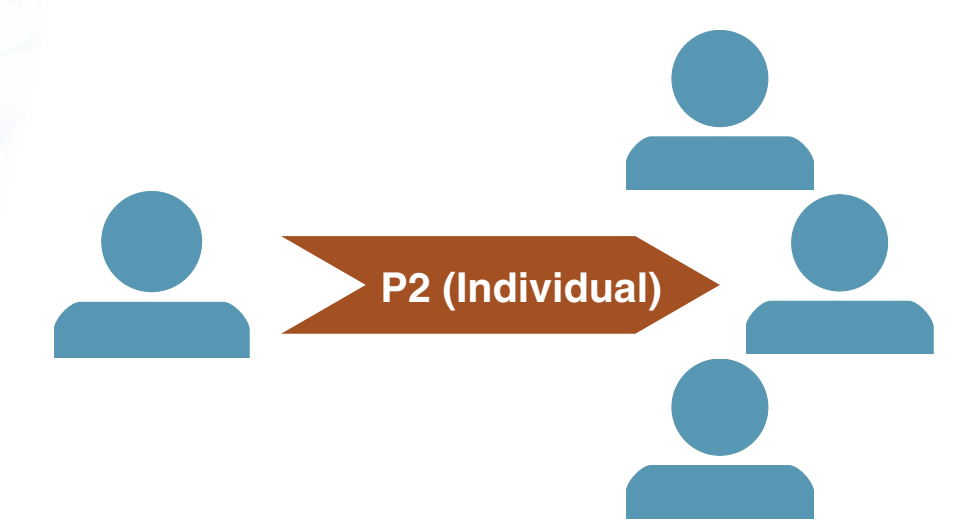
Data Collection by Numbers

12 Groups of 6
15 Supervisors
87 Observations

22 Interviewees (staff + students)
27 Interviews

Preliminary Findings: Tensions & Tactics

Students' experience of tension were observed in **individual** phases of design.



Their pursuit for **individual creativity** opposes a greater **need for verification**. Some students address deficiencies by forming **learning groups peers that are tasked** similarly.

Staff experience tensions as both advisor and evaluator, especially those with non-CE backgrounds. This combined with **high specificity in marking criteria** was found to lead to difficulty for staff to interact with students' inquiries at supervisory meetings.



Advisor Evaluator

Future Work: UK-Wide CE DP Survey

We hope to conduct a UK-Wide CE DP survey to verify observations as well as identify good practice for DP delivery to benefit CE graduates. If you, or your DP coordinator, would be interested, **please email abdul.sharif@strath.ac.uk**

References

- A.J. Fletcher, A. W. A. Sharif, M. D. Haw (2016) Using the perceptions of chemical engineering students and graduates to develop employability skills. Education for Chemical Engineers
- IChemE (2017) Accreditation guide and Design Checklist
- Glaser, B.G. & Strauss, A.L. (1967.) The Discovery of Grounded Theory