MONASH University

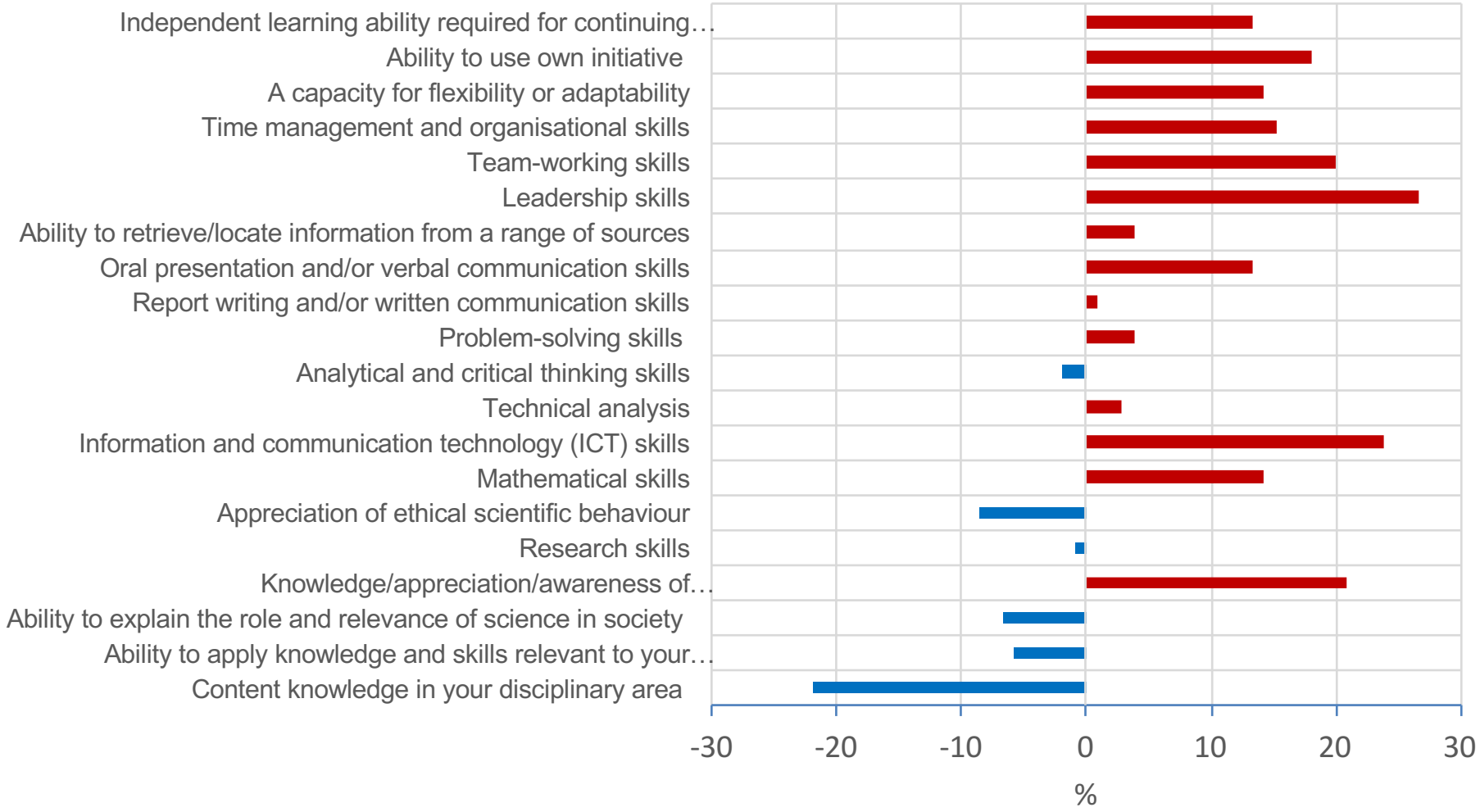
Transforming Laboratory Learning – Bringing WIL into the Curriculum

Professor Tina Overton
School of Chemistry

GROUP OF EIGHT AUSTRALIA

MONASH
Chemistry Education Research Group

Building on research evidence

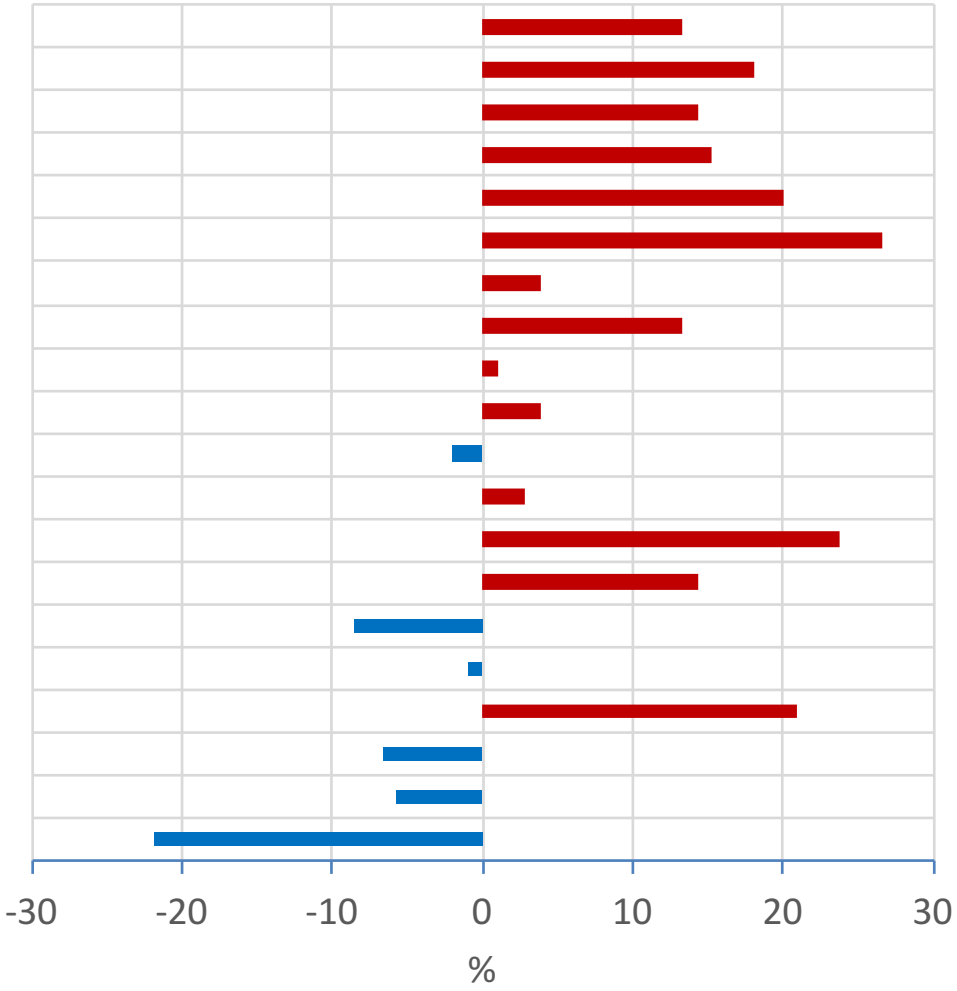


Sarkar, Overton, Thompson, Rayner, IJISME, 2016, **24,** 3, 31-48.

Building on research evidence

Knowledge science in society, ethics.

‘Soft skills’, commercial awareness, maths & IT skills.



Sarkar, Overton, Thompson, Rayner, IJISME, 2016, **24,** 3, 31-48.

*I find some high performing 'quantitative' students struggle with **unsolvable problems** (e.g. not enough data is available) or uncertain situations (e.g. what does the customer want). If possible give them some exposure to **uncertain/ambiguous problems**.*

More focus on taking students from being students to being employees - preparing them for work.

Can we address employability in the lab?

Style	Outcome	Approach	Procedure
Expository	Predetermined	Deductive	Given
Inquiry	Undetermined	Inductive	Student generated
Discovery	Predetermined	Inductive	Given
Problem-based	Predetermined	Deductive	Student generated

DS Domin, *JChemEd*, 199, **64**, 4, 543-547

there is research evidence that the approach is effective at developing a wide range of skills, such as ***communication***, ***problem solving***, *and* ***experimental design*** *and that they* ***motivate*** *and enthuse students*

S Sandi-Urena, MM Cooper, TA Gatlin and G Bhattacharyya, *Chem. Educ. Res. Pract.*, 2011, **12**, 434–442

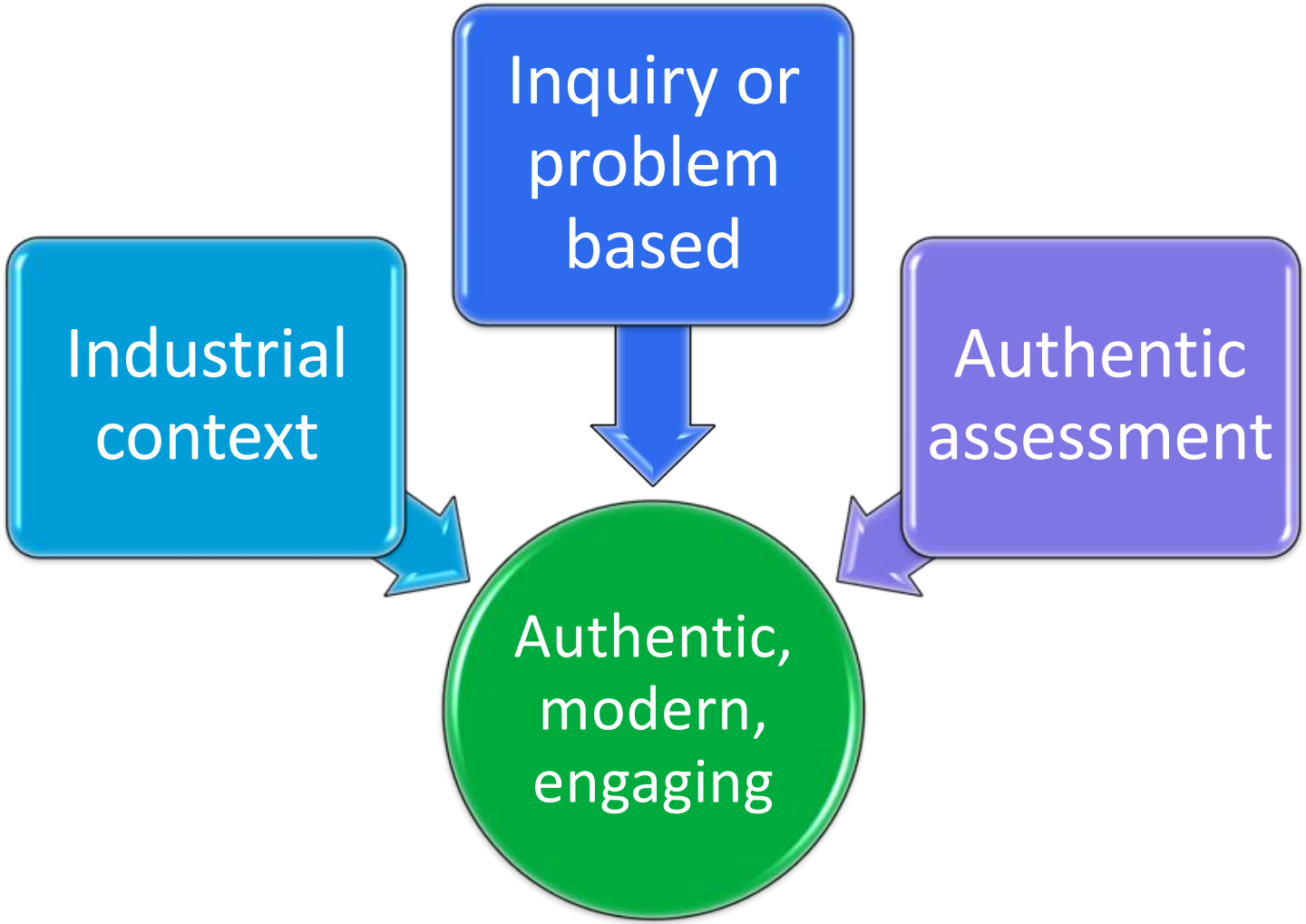
PN Pushpalatha, MT Murthy and K Hungwe, *J. Chem. Educ.*, 2014, **91**, 1909-1917.

Impact of WIL on students

- Improve student engagement
- Reduce drop out
- Aid transition from study to work
- Developing discipline specific, general and career skills
- Teach professional conduct, career planning
- Understanding of the perspectives of potential employers
- Develop problem solving, communication, information literacy, digital literacy, and professionalism;

Work integrated learning in STEM in Australian Universities, *ACER*, 2015

Our approach to new laboratory programme

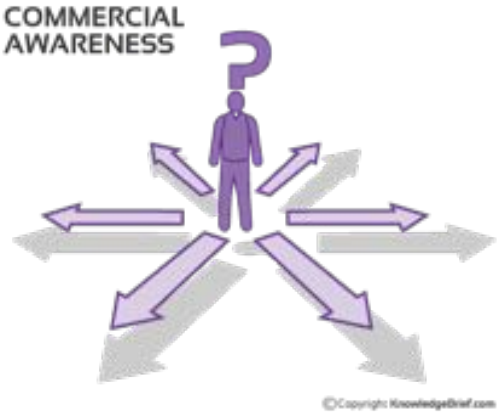


Our approach

- Industrial context
- Industry partner/logo
- Student ownership
- Years 1, 2, 3
- Industry videos, pre-labs
- Reduce cognitive load
- Varied assessment
- Support skills gaps
- Manuals, TA notes, marking schemes
- TA training

Engaging industry: First Contact

- Many companies are eager to engage
- They often don't know how to
- Do research on the company
- Use contacts at one company to reach into others
- Be clear about what you want
- Find the right people, level
- Site visit
- Have options



Example – Analysis of acetic acid Year 1

Mars uses vinegar in a wide range of its SuperCook products. The acetic acid concentration varies with its use. Vinegar for table use contains acetic acid at a level of 3-9%. Pickling vinegar contains acetic acid at up to 18%.

Determine whether the sample of vinegar provided is suitable to be used to make salad dressing.

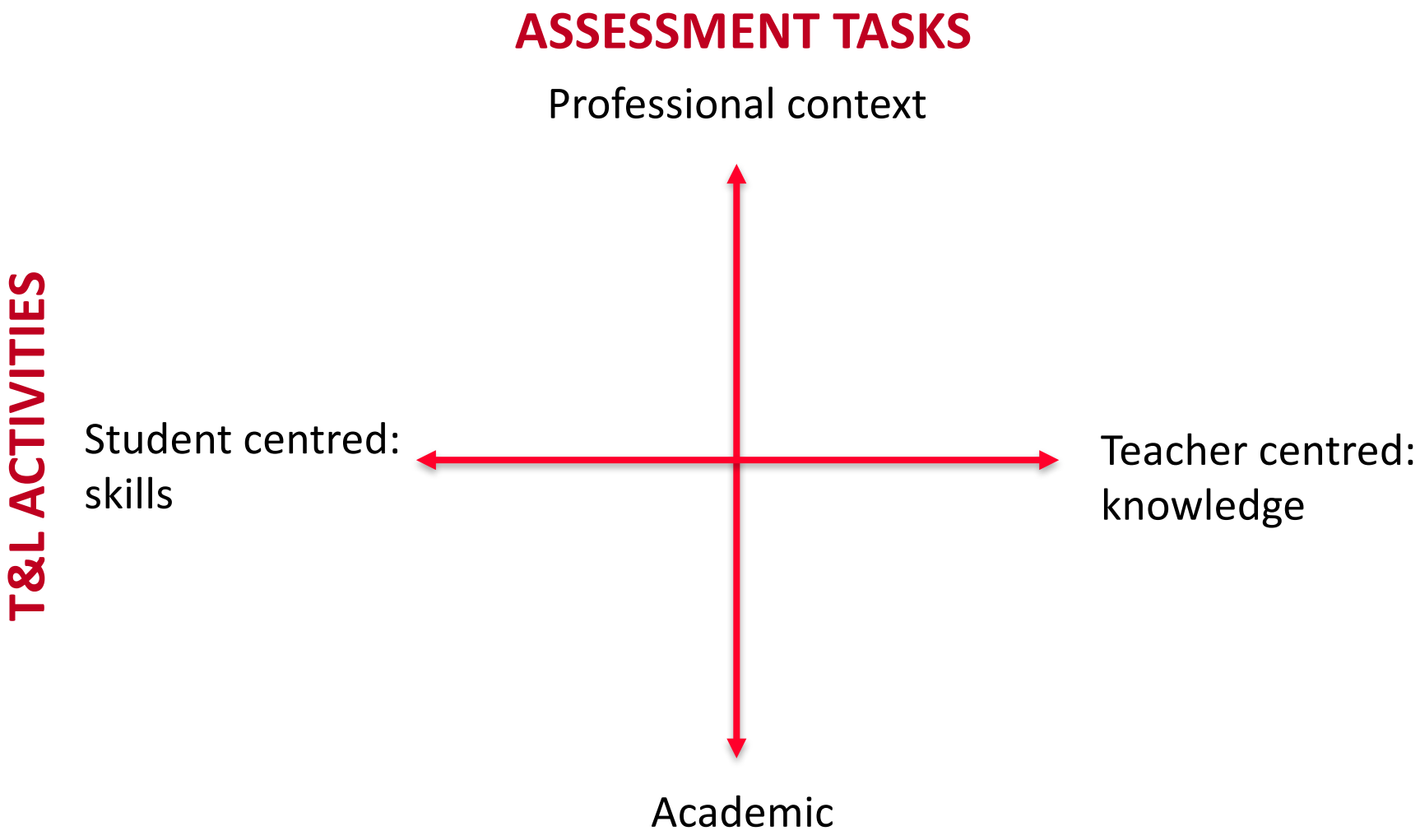
MARS food

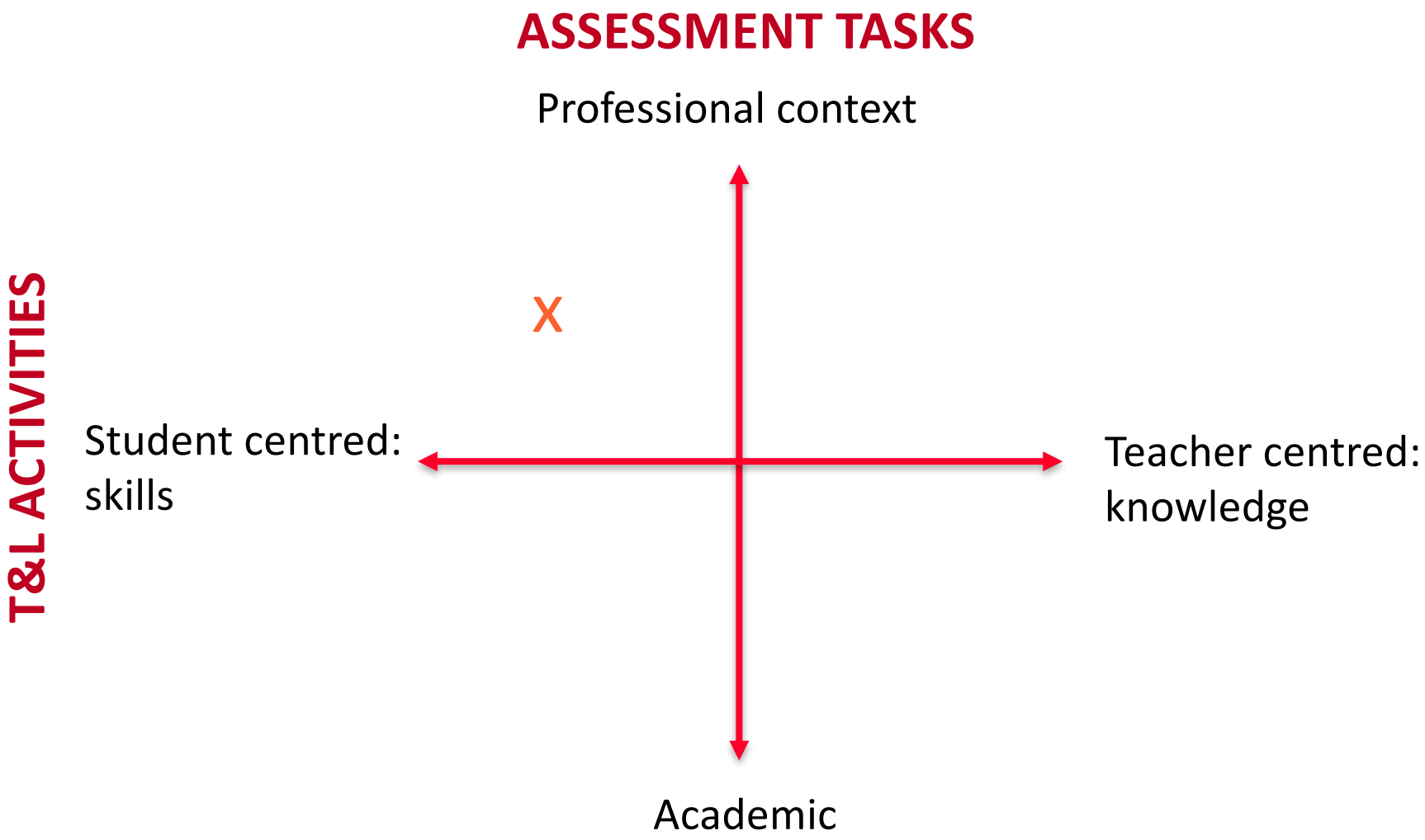
Example – Synthesis of acetylferrocene Year 2

MPEX manufacture a petrol additive to enable classic cars to run on leaded petrol. The additive contains ferrocene. Your company wants to explore this niche market but think that acetylferrocene could be more effective. Synthesize and purify a sample of acetylferrocene and cost it compared to ferrocene.

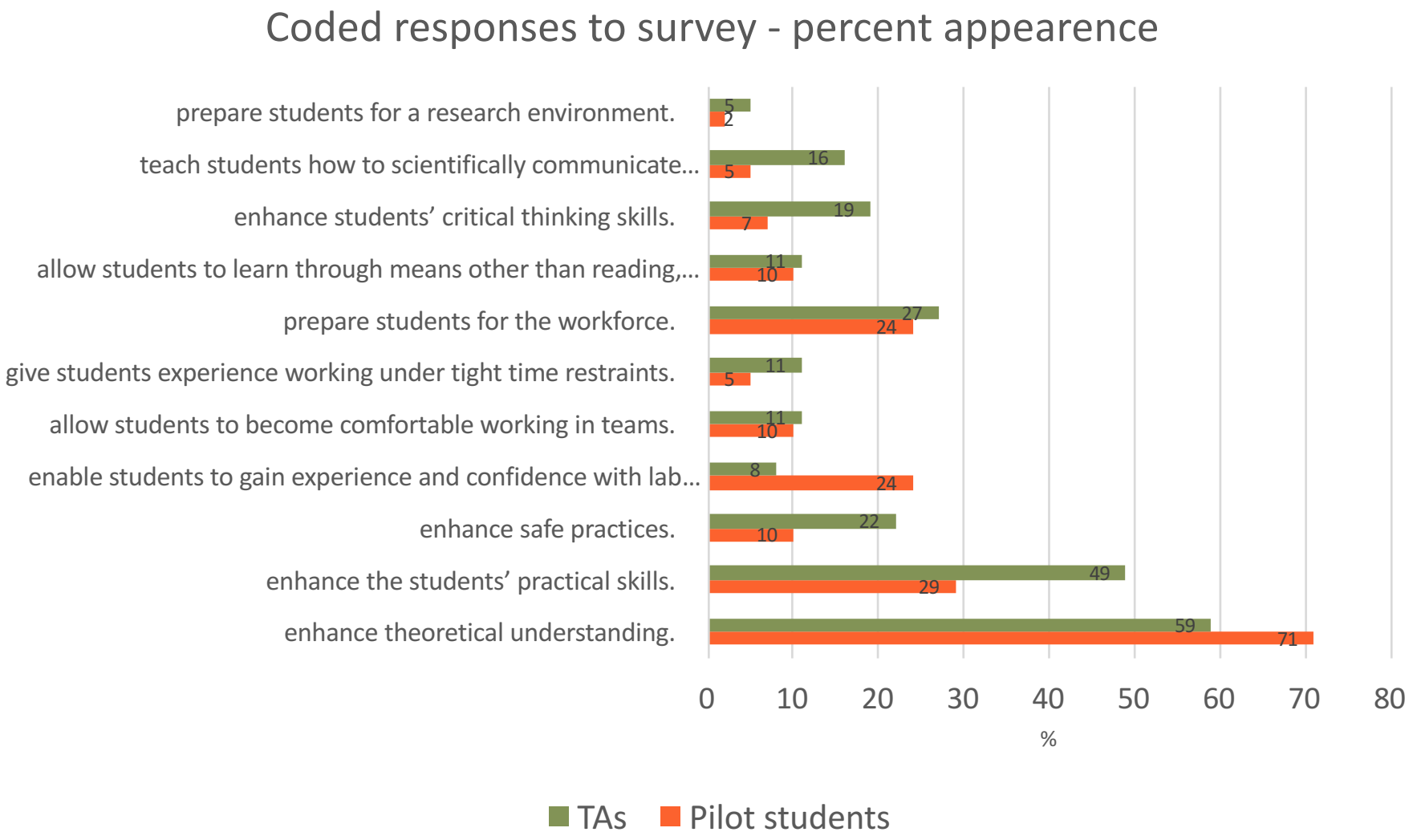
Write a report for the Technical Director outlining your costed synthesis with a price $/kg.

Mapping authenticity




ASSESSMENT TASKS
Professional context
T&L ACTIVITIES
X
Student centred:
skills
Teacher centred:
knowledge
Academic

Researching the effectiveness of TLL - Presurvey



What skills did you develop today?

Did you enjoy todays' lab?

Student feedback

How data can be produced and used in real world scenarios.

I learnt how to construct a method to investigate questions that are applicable for the real world.

How to work in a team, investigation skills, leadership skills, chemistry techniques

Relating the pracs to what you would be doing in the workforce.

Industry experience. Seeing how a given experiment might be carried out in industry.

Challenges

- Working across 20 units in 3 years
- Overcoming complacency
- Identifying enough industrial contexts
- Inquiry *vs* WIL
- Collaborating at the right level
- Authenticity – actual *vs* perceived
- Changing role of TAs
- Training TAs

Thank you

- Angela Ziebell
- Stephen George
- Faculty of Science

- tina.overton@monash.edu