Accrediting outcomes
Evidencing the skills necessary for employability
Daniel Southam
@danielsoutham  d.southam@curtin.edu.au
Today’s outline

✓ The need proposition for changing accreditation processes
✓ Development of a new accreditation process using shared outcomes
✓ Some observations about the self-reporting of shared outcomes in chemistry curricula
✓ Links between outcomes, assessment, and the employability of chemistry graduates
Disrupted or disruptive?

How do science and scientists remain employable?
What role does a professional body have in a post-professional world?
## Susceptibility to computerisation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Prob.</th>
<th>Occupation</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Scientists</td>
<td>0.0045</td>
<td>Environmental Scientists</td>
<td>0.033</td>
</tr>
<tr>
<td>Teachers and Instructors</td>
<td>0.0095</td>
<td>Mathematicians</td>
<td>0.047</td>
</tr>
<tr>
<td>Pharmacists, Microbiologists</td>
<td>0.012</td>
<td>Chemists, Physicists</td>
<td>0.1</td>
</tr>
<tr>
<td>Biological Scientists</td>
<td>0.015</td>
<td>Actuaries</td>
<td>0.21</td>
</tr>
<tr>
<td>Conservation Scientists</td>
<td>0.016</td>
<td>Physical Scientists</td>
<td>0.43</td>
</tr>
<tr>
<td>Soil and Plant Scientists, Materials Scientists</td>
<td>0.021</td>
<td>Geoscientists</td>
<td>0.63</td>
</tr>
<tr>
<td>Biochemists and Biophysicists</td>
<td>0.027</td>
<td>Atmospheric and Space Scientists</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Drivers for change

✓ Move from environmental “inputs” to student “outcomes”
✓ Harness the community consensus threshold learning outcomes
✓ Adapt to modern curricular practice in the sector
✓ Align with the Higher Education Standards processes
The landscape

What are (collectively) the graduate outcomes that we want?

How will we (collectively) know that students have met these outcomes?

Higher Education Standards Framework (Threshold Standards) 2015, pt A, s 1.4.
Threshold Learning Outcomes

1. Understanding science
2. Scientific knowledge
3. Inquiry & problem solving
4. Communication
5. Personal & professional responsibility

Question 1

Here are some potential outcomes of a chemistry degree.

Are they desirable for the **future employability** of a chemistry graduate?

Tick the ones you think are desirable and then click “submit answer” when you’re done.

Question 1 \((n = 113)\)
Which outcomes are desirable for the future employability of a chemistry graduate?
Accreditation process
Desired characteristics

✓ Outcomes-focussed
✓ Data-driven
✓ Shared understanding
✓ Benchmarked
✓ Referenced
Chemistry accreditation
Establishing a framework

Allows systematic comparison of diverse curricula

INTENDED
A posteriori
idealised curriculum
CTLOs

IMPLEMENTED
Operational curriculum
Curriculum map aligned to TLOs

PERCEIVED
Experienced curriculum externally validated by panel

ACHIEVED
Attained curriculum referenced & benchmarked

Developed by Rosier and Keeves (1991) from the work of the International Association of Evaluation of Educational Achievement (Goodlad 1966) and extended by Treagust (1986)
✓ Data is collected for each component of a degree

✓ The nomenclature in the survey is adapted for the local context

✓ The institution to be accredited complete a survey for each component

Step 1
Data is collected from an online survey

View a demo at: po.st/demo.survey
Learning outcomes
Three step mapping process

Assessments
Which assessment types are explicitly assessing the learning outcomes?

Engagement
Which learning outcome(s) are taught, practised and/or assessed?

Ranking
For each assessment type rank their development of each learning outcome
Step 2

This data is used to prepare a curriculum map

✓ Aggregates data to chart the operational curriculum

✓ Permits a shared understanding between host and panel for a purposeful accreditation visit

View a demo at: po.st/demo.report
✓ Visit to the host institution by a panel of trained accreditors
✓ Information from the curriculum map is used to guide the discussion
✓ The panel reflect on development of the outcomes

Step 3
A visit to the host institution by a panel validates this map

STRENGTHS
What elements are strong, important or influential that demonstrate good practices at the institution, in curriculum and expressed through assessment?

INSIGHTS
What elements were you unaware of that you now think are important or influential at the institution, in curriculum and expressed through assessment?

IMPROVEMENTS
What elements of assessment practice or curriculum need change, and how might the institution change them?
This report collects together the curriculum map and the panel’s findings.

Validates the (mis)alignment between the implemented curriculum and perceived curriculum.

Step 4

The panel prepares a report for endorsement.

✓ Commendations
✓ Affirmations
✓ Recommendations
Aggregated data

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutions</td>
<td>7</td>
</tr>
<tr>
<td>Campuses</td>
<td>10</td>
</tr>
<tr>
<td>Degrees</td>
<td>11</td>
</tr>
<tr>
<td>Units/courses</td>
<td>129</td>
</tr>
<tr>
<td>Assessment tasks</td>
<td>452</td>
</tr>
</tbody>
</table>

There are three potentially interesting elements to these data:

1. **Learning activities**
   - Number of learning activities

2. **Assessment tasks**
   - Number of assessment tasks

3. **Learning outcomes**
   - Number of learning outcomes
Observations

✓ Students are crucial to elucidating the outcomes of their experiences
✓ Staff are committed to students and improving their experiences
✓ Each panel operated differently, responding to institutional culture
✓ All panels were able to judge whether TLOs as a whole were attained
✓ There were differing interpretations of some TLOs between institutions
✓ There is some desire to accredit programs beyond undergraduate courses and in transnational institutions or partnerships
Question 2

What was the most frequently encountered (taught, practised or assessed) outcome?

Tick one outcome and then click “submit answer”
Question 2 (n = 94)
What was the most frequently encountered (taught, practised or assessed) outcome?

- Understanding science
- Scientific knowledge
- Inquiry & problem solving
- Communication
- Personal & professional responsibility
Question 3

Other than knowledge of the principles and concepts of chemistry, what was the most frequently encountered (taught, practised or assessed) outcome?

Tick one outcome and then click “submit answer”
Question 3 \((n = 103)\)

Other than knowledge of the principles and concepts of chemistry, what was the most frequently encountered (taught, practised or assessed) outcome?

[Bar chart showing the frequency of different outcomes. The most frequent outcome is Inquiry & problem solving.]
Question 4

What was the most infrequently encountered (taught, practised or assessed) outcome?

Tick one outcome and then click “submit answer”
Question 4 ($n = 98$)

What was the most infrequently encountered (taught, practised or assessed) outcome?
CTLO Network Map
Unit level (n = 129)

CTLO3.5: Demonstrating the cooperativity and effectiveness of working in a team environment

CTLO1.3: Understanding and being able to articulate aspects of the place and importance of chemistry in the local and global community

CTLO3.3: Applying recognised methods and appropriate practical techniques and tools, and being able to adapt these techniques...

CTLO2.1: Demonstrating a knowledge of, and applying the principles and concepts of chemistry
Question 5

Other than knowledge of the principles and concepts of chemistry, what is the **most often assessed outcome**?

Tick one outcome and then click “submit answer”
Question 5 ($n = 100$)
Other than knowledge of the principles and concepts of chemistry, what is the most often assessed outcome?
CTLO Network Map

Assessment level \( (n = 452) \)

- Almost every task (86%) submitted will assess chemistry knowledge
- 57% of tasks assessing content knowledge simultaneously assess demonstration of self-directed learning
Outcomes

**STRENGTH**
2.1

Demonstrating a knowledge of, and applying the principles and concepts of chemistry

88% 🗞️ 86% ✔️ 92% ⬇️

**INSIGHT**
5.1

Demonstrating a capacity for self-directed learning

88% 🗞️ 56% ✔️ 68% ⬇️

**IMPROVEMENT**
1.3

Understanding and being able to articulate aspects of the place and importance of chemistry in the local and global community

57% 🗞️ 27% ✔️ 43% ⬇️
Acknowledgements

@danielsoutham  d.southam@curtin.edu.au

RACI:

- **Presidents**: Paul Bernhardt, Mark Buntine, Peter Junk
- **National Office**: Caroline Lewington, Mary Pappa, Roger Stapleford, Robyn Taylor
- **Accreditation Committee**: Jason Harper, Gwen Lawrie, Glennys O’Brien, Matt Sykes, Chris Thompson

Chemistry TLO development

- Mark Buntine, Glennys O’Brien, Simon Pyke, Brian Yates

**Trial and pilot phase institutions and panel members/chairs**

- [po.st/demo.survey](po.st/demo.survey)
- [po.st/demo.report](po.st/demo.report)
References


*Higher Education Standards Framework (Threshold Standards) 2015, pt A, s 1.4.*


