The ALURE of undergraduate research: developing leadership through sharing successful models

Dr Paula Myatt
paula.myatt@outlook.com

Dr Susan Rowland
School of Chemistry and Molecular Biosciences, UQ
s.rowland1@uq.edu.au
Objectives of the session

– To explain ALUREs (Authentic Large-scale Undergraduate Research Experiences).

– To discuss some of the issues we have uncovered while assisting people develop or refine their ALUREs.

– To help you develop successful models for supporting teaching innovation and institutional change.
An OLT Leadership for Excellence Project: Developing and resourcing academics to help students conduct and communicate undergraduate research on a large scale

Team ALURE
From left Dr Susan Rowland - Primary Project Leader (s.rowland1@uq.edu.au), Co-leaders Dr Gwen Lawrie and Dr Kirsten Zimbardi, Team members Dr Jack Wang and Dr Paula Myatt, and Project manager Mr Peter Worthy
What is an ALURE?

• **Authentic Large-scale Undergraduate Research Experience in science**

• Hands-on research in the **undergraduate-course** laboratory

• Projects are part of **authentic** research initiatives and results are communicated to “someone who cares”

• Allows **many students** to participate in research

---

Less student autonomy & responsibility

Guided inquiry

Open inquiry

Individual research internship

More student autonomy & responsibility
ALURE Example: Examining the insecticidal activity of an uncharacterised toxin
Why the ALURE OLT project?

• Developing and resourcing academics to help students conduct and communicate undergraduate research on a large scale.

• We aim for sustainable development and support of new leaders.
ALURE Project activities

Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources

For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

Scope and Scale
- 14 ALURES
- 6 sites
- 34 academics
- >20 professional staff
- >1300 UG students
- 2 Hons students
What’s your experience?

Existing Leaders
You have already implemented large-scale undergraduate research

Think about ALURE
Propose two factors that assist with successful ALURE uptake and sustainability.

New Leaders
You are considering implementing large-scale undergraduate research

Think about ALURE leadership
Identify two things that you, as a leader, can do to build a successful ALURE for your students.
Hidden issues impacting success

Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources
For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

We had thought these resources would be “enough” to drive uptake of the ALURE program at multiple universities.
Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources
For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

But … what we found is that there are hidden issues impacting success.
Hidden issues impacting success

Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources

For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

Context
Evaluating learning
Fear of failure

Fear of failure
Hidden issues impacting success

Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources

For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

Fear of failure
Hidden issues impacting success
Hidden issues impacting success

Existing Leaders
Assist them to:
- Evaluate
- Refine
- Document their practice
- Reflect

New Leaders
Assist them to:
- Understand their context
- Design their ALURE
- Obtain ethics approval
- Evaluate
- Reflect

Resources

For teacher use:
- ALURE protocols
- Ethics exemplars
- FAQs and tips
- Online CoP

For student use:
- Workbooks
- Assessment

For evaluation:
- Reflections
- Surveys

Risk…
Take-home message – reduce risk

Through readiness for change
• Institutional structure that encourages and allows innovation
• Central change agent that offers support and influences

Through evaluation and evidence
• Gather targeted evidence to support your planned objectives

Through mentoring
• Resources and a website are not enough
• Immediate, personal access to experienced mentors is key
Acknowledgements

Our mentors and our new implementers:

- **Australian National University** (Dr P Newitt, Dr C Fulton, Assoc. Prof. S Howitt, Mr S Jones)
- **Curtin University** (Dr D Southam, Assoc. Prof. M Mocerino)
- **Deakin University** (Dr J West, Dr S Cheung, Dr L O’Sullivan, Dr A Veenstra-Quah)
- **Newcastle University** (Prof. L Milward, Dr J Weidenhofer, Ms B Goldie, Prof. J Scott, Dr K Mate) and **Sydney University** (Dr D Johnstone)
- **University of New South Wales** (Dr L Lutze-Mann, Dr R LeBard, Dr A Galea, Mr J Wilson)
- **University of Queensland** (Dr A Bugarcic, Dr K Colthorpe, Dr J Fraser, Mr M Green, Assoc. Prof. L Grondahl, Prof. R Hall, Prof P Hugenholtz, Dr K Jack, Dr U Kappler, Dr G Lawrie, Dr P Myatt, Ms R Pedwell, Dr S Rowland, Prof. M Schembri, Dr G Tyson, Dr J Wang, Prof. P Young, Dr K Zimbardi)

Our funding partners:
“We’re building capacity within our own little team; knowing that we could email you and ask “What can we do here?” was.... [makes happy, expansive hand gestures].

It’s just knowing that it’s not all left to you!

You’ve got an outside with people who have more experience in that space than you. You develop it [the research experience] as your own, but within the wider ALURE family.”

Quote from new implementer, Deakin University
MICR2000 URE - The Human Microbiome

Roche 454 Sequencer
GS FLX titanium
“Pyrosequencer”
ALURE Project activities

Evaluation

Implementation teams
- Personal visits, phone calls, and Skype sessions (when needed)
- Record Interviews during scoping and development
- Record reflective “exit” interviews

Student experience
- Pre-post surveys (CASPiE, Skills Self-Evaluation, and URSSA)
- Mid-term and post reflections (Roses, Buds, and Thorns)
1. The UQ context

- Australia has 39 universities
- UQ is a research intensive university, offering a comprehensive education
- Total students = 48,000
  - 36,000 undergraduate
  - 12,000 postgraduate
  - Includes 11,000 international students
- UQ research ranking:
  - #3 in Australia
  - #63 Times Higher Education World University rankings
  - #85 in Shanghai Jiao Tong ranking
1. The UQ context

- 6 Faculties
- Total staff = 6,900
- Academic staff = 2,800

### Academic staff

<table>
<thead>
<tr>
<th>Academic category</th>
<th>No. academic staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO</td>
<td>1,438 (50%)</td>
</tr>
<tr>
<td>T&amp;R</td>
<td>1,265 (42%)</td>
</tr>
<tr>
<td>TF</td>
<td>156 (6%)</td>
</tr>
</tbody>
</table>
FAQ 2: What is an appropriate research question for an ALURE?

• Needs to impart key scientific skills (laboratory, critical reasoning, communication)
• May also be discipline specific
• Build a question and project where students will have to assess their progress and make decisions
• Carefully consider whether the course coordinator has the capacity to troubleshoot problems that will occur
• **Audience:** Write down an appropriate research question for your ALURE
MICR2000: Traditional or Molecular Methods?

16S rRNA sequencing

VS

MALDI-TOF

Gram-Staining
Microscopy
Selective/differential culturing
Metabolic tests
Antibiotic Sensitivity testing

Audience: Think about the experimental approach your ALURE students could take
Why run an ALURE?

- Providing varying levels of challenge for students
- Giving students experience of research before they arrive in the research labs
- Tailoring a course or courses to develop desired skills in graduates