ALURE PROJECT

An ALURE (Authentic Large-Scale Undergraduate Research Experience) for Your Students: Designing for Success Using Learnings from a Multi-Institutional, Multi-Disciplinary Project

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Structure for today

- Identification of attendees who are thinking of designing a large-scale URE (and a room reshuffle?)
- Introduction to ALURE
- Workshop design time interspersed with short presentations and feedback from critical friends and supporters

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While we move around (or not)….

- Identify a large group of your students who might benefit from a URE
- What could they research?
- Why would it interest them?
- Who else cares about the results? (who can they tell?)

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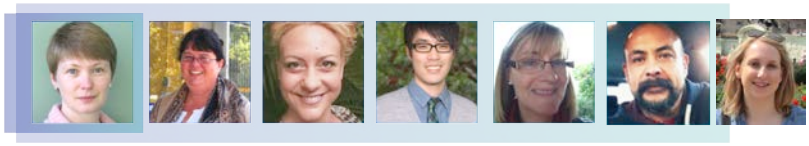
Team ALURE

Authentic Large-Scale Undergraduate Research Experiences



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 Research officer Rhianna Pedwell

Take a tour of the ALURE project here:
www.alure-project.net/

Take a virtual tour of SCMB here:
http://www.scmb.uq.edu.au/virtual-tour

ALURE PROJECT

Project Impact

We identified and documented, or implemented and evaluated 21 ALUREs. Eleven were developed in association with the authorship team. This represents an annual engagement of over 7000 undergraduate students in authentic research. We also built a nationwide Community of Practice of 39 academics, some of whom have formed new mentor-mentee relationships, and have received recognition for their teaching and learning contributions.

Deliverables

- The Implementer's Checklists for novice implementers designing and developing an ALURE
- Detailed exemplars of the implementer experience in ALUREs from around Australia
- An evaluation instrument trialled in multiple course evaluations
- Artefacts from ALURE implementations; protocols, task descriptions, and student work
- Exemplar data on the impact of ALUREs on student perceptions and attitudes towards research and their learning gains

Support for this project has been provided by the Australian Government Office for Learning and Teaching.
The project participants are gratefully acknowledged.

Lead Institution:

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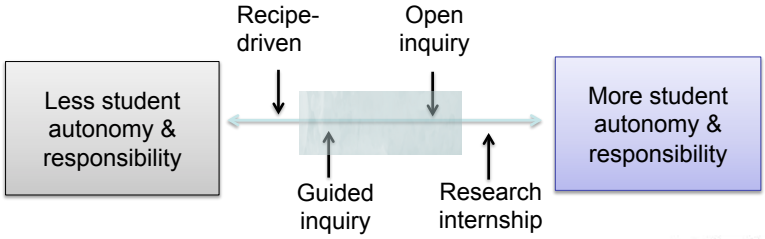
What is an ALURE?

- Hands-on research in the **undergraduate-course** laboratory, clinic, or workshop
- Projects are part of **authentic** research initiatives and results are communicated to "someone who cares"
- Allows **many students** to participate in research
- **Varies** by year level, desired learning outcomes, and discipline – no single model



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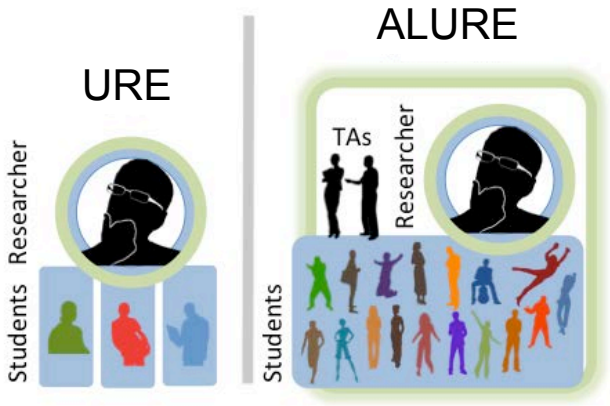
The ALURE Model



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Why is ALURE "Authentic"?

Aspect or Definition of Authenticity	*Count*
Experience of what scientists "do" (practices), how science is done, and what science "is"	15
Ownership/personal relevance to student	7
Experimental design; question/hypothesis, including by students	6
Results are novel/publishable/contribute to existing research; communication of results	4 each
Critical thinking	3
Data analysis; peer teamwork; interested audience	2 each
One project for the course duration; "Emerges" from constituent parts of experience; extended participation time; "open investigations"; "ill-structured and complex goals"; appropriate for the learner education level	1 each

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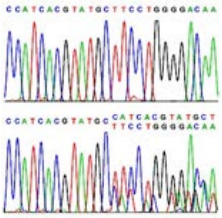
Microbiology - 500 students examine the human microbiome

VS

16S rRNA sequencing



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

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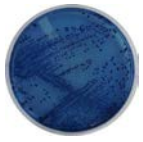

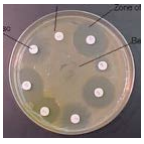

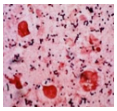

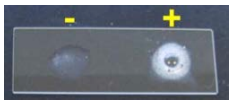

Rotate swab in QuickExtract™ DNA Extraction Solution

Heat at 65°C for 1 minute and 98°C for 2 minutes

PCR-ready DNA

Roche 454 Sequencer
GS FLX titanium
"Pyrosequencer"

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Physiology – 200 students examine the effects of eating dark chocolate on their mental acuity

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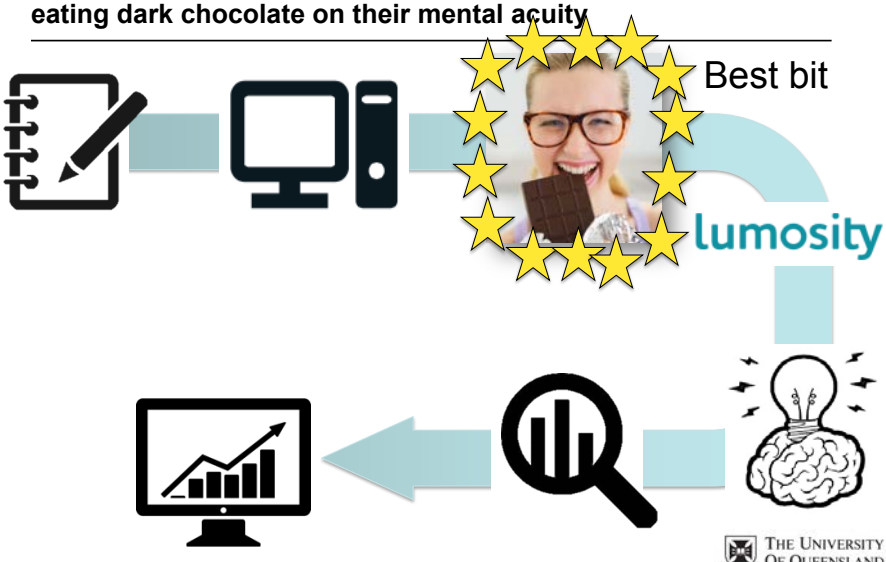

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What about student learning gains?

- Students perceive multiple learning gains and changes in professionalism
- Students see this activity as authentic to the practice of science
- Some students volunteer to help the lab staff prepare; others bring protocols and ideas from their part-time jobs for the project
- Academics note a change in the types of questions that students ask
- Students use this activity as a way of differentiating themselves when applying for positions in labs, for international study, and for higher degree programs
- Students who complete optional 4th year Honours degree in SCMB BSc are predominantly ALURE participants

References:

- ***Do we need to design course-based undergraduate research experiences for authenticity?*** Rowland, Pedwell, Lawrie, Lovie-Toon, Hung. CBE-LSE (in press)
- ***A unique large-scale undergraduate research experience in Molecular Systems Biology for non-mathematics majors.*** Kappler, Rowland, Pedwell. BAMBED (in press)
- ***Developing and resourcing academics to help students conduct and communicate undergraduate research on a large scale.*** Rowland, Pedwell, Lawrie, Worthy (2016) Sydney: Office for Learning & Teaching
- ***Assessment of course-based undergraduate research experiences: a meeting report.*** Auchincloss LC, et al. CBE Life Sci Educ (2014) 13(1):29-40.
- ***Is the undergraduate research experience (URE) always best?: The power of choice in a bifurcated practical stream for a large introductory biochemistry class.*** Rowland, Lawrie, Behrendorff, Gillam. BAMBED (2012) 40(1): 46–62

alure-project.net → Resources

Implementer's Checklists

- Design and Logistics
- Motivation and Value
- Support for Students
- Evaluation

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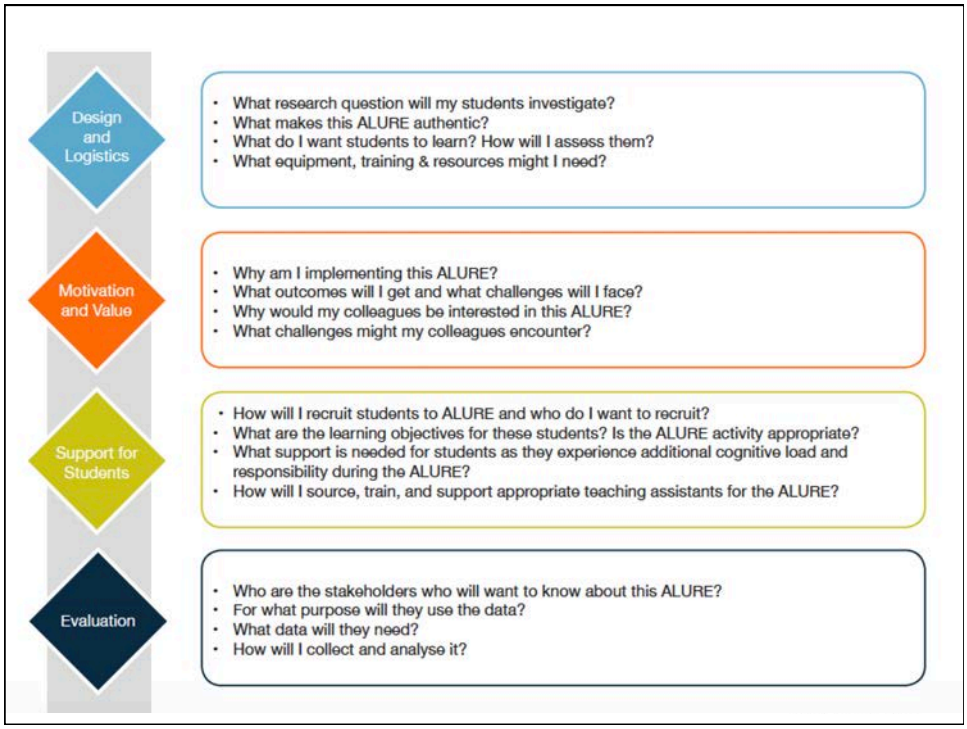
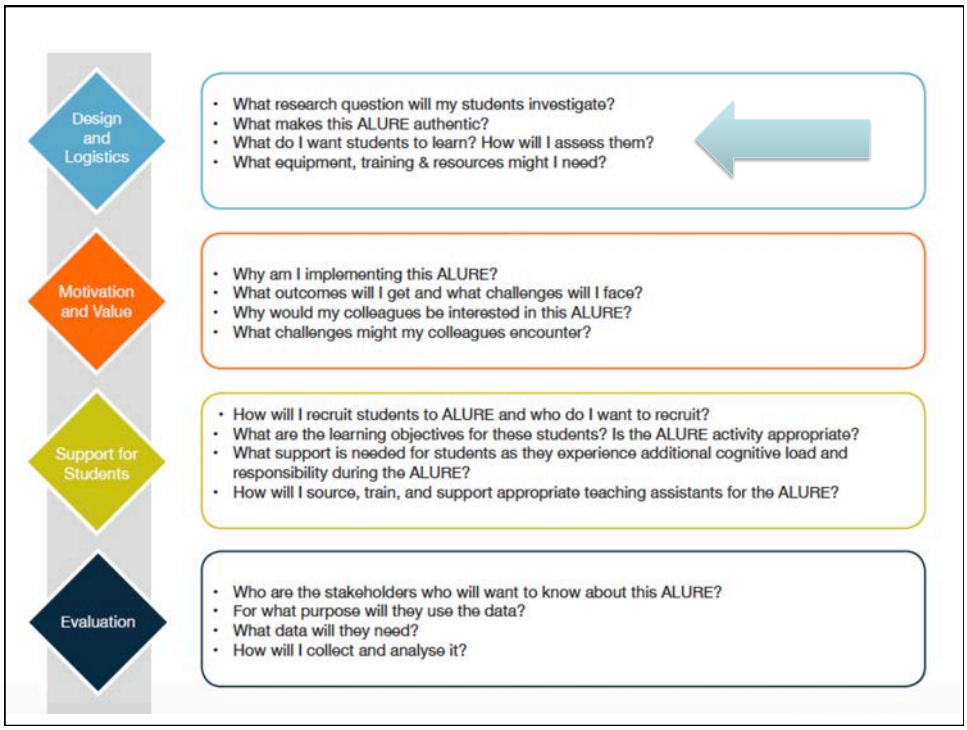

Design and Logistics
What research question will my students investigate?
What makes this ALURE authentic?
What do I want students to learn? How will I assess them?
What equipment, training & resources might I need?
Motivation and Value
Why am I implementing this ALURE?
What outcomes will I get and what challenges will I face?
Why would my colleagues be interested in this ALURE?
What challenges might my colleagues encounter?
Support for Students
How will I recruit students to ALURE and who do I want to recruit?
What are the learning objectives for these students? Is the ALURE activity appropriate?
What support is needed for students as they experience additional cognitive load and responsibility during the ALURE?
How will I source, train, and support appropriate teaching assistants for the ALURE?
Evaluation
Who are the stakeholders who will want to know about this ALURE?
For what purpose will they use the data?
What data will they need?
How will I collect and analyse it?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Let's work on a design for you and your students

ALURE Project
Implementer's Checklist - Design & Logistics

1) What students will you design for?
   - Why these students?
   - Learning Objectives?
2) What research question will they address? (Report out)
3) Why is this research question important? Who cares?

All resources are available at alure-project.net

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What supports and challenges do you anticipate?

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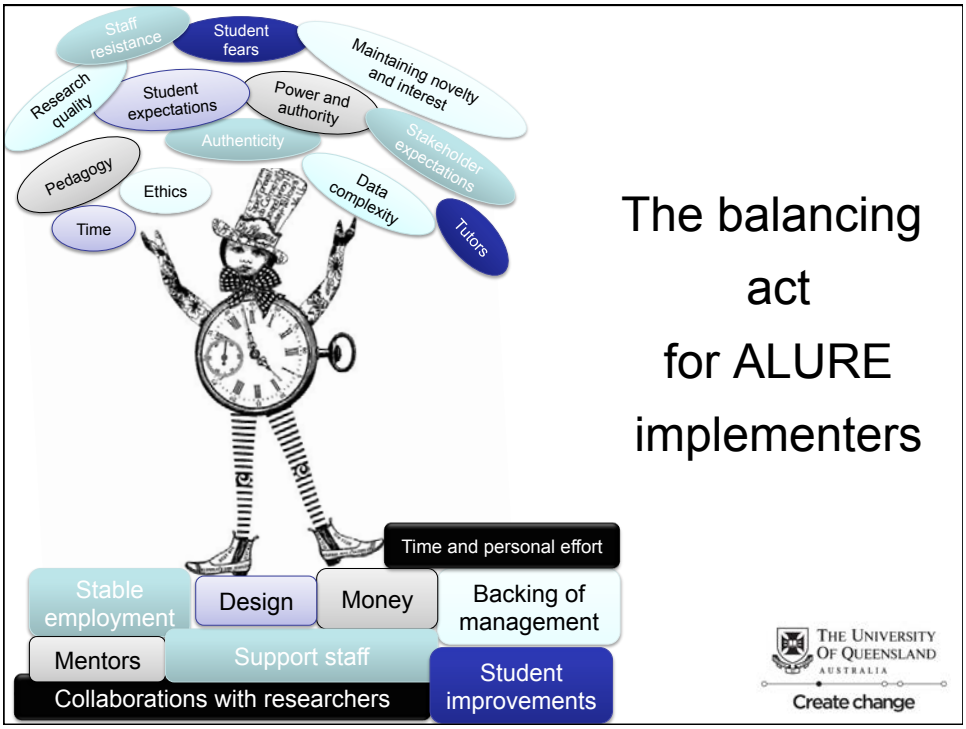

The balancing act for ALURE implementers

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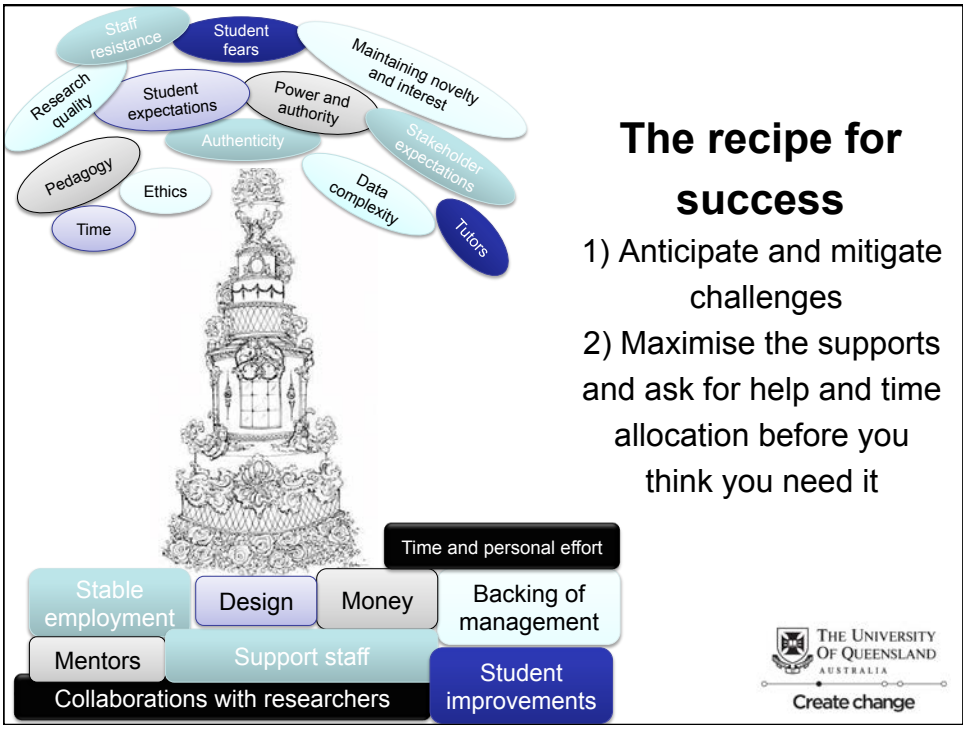

The recipe for success

1) Anticipate and mitigate challenges
2) Maximise the supports and ask for help and time allocation before you think you need it

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Please let me know if you need help with your ALURE:
s.rowland1@uq.edu.au

Thank you!

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