

Incorporating the development of
research skills into level 1
undergraduate human biology courses



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Background

Human Biology I

- **Core level I course in BHIthSc Program**
- **Investigates issues of life, health & wellbeing of humans**
- **Approx 120-140 students**

The Challenges

- **Diverse student population**
 - Broad spectrum of prior educational experiences
 - No specific program entry prerequisites or assumed knowledge
 - Broad range of abilities (knowledge base & research skill level) from basic → good
- **How to effectively assess skills and attitudes, not just course content**
- **100 + students**
 - Assessment workload must be manageable





Background

The Approaches

- Find out what students can and can't do
 - **RSD (Research Skill Development) Diagnostic** in O-week
(as part of a *Skills Workshop* for all commencing BHIthSc students)
- Gradual introduction to research skills via **RSD Tasks**
 - **Literature-based RSD Tasks**
 - **Laboratory-based RSD Tasks**
 - **Combined literature & laboratory-based RSD Tasks** – Semester 2
- RSD Tasks supported by targeted workshops/tutorials

Semester 1





RSD Framework

= Method of assessment of RSD Tasks

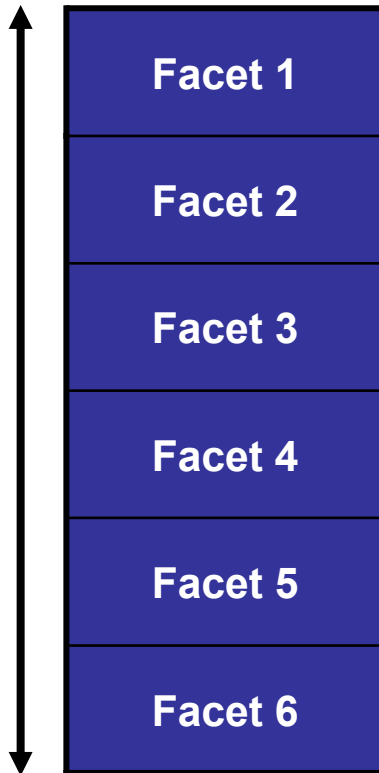
- Developed by Willison & O'Regan, 2007 [*HERD* 26(4):393-409]
 - Handbooks available or visit <http://www.adelaide.edu.au/clpd/rsd>
- **6 facets of research inquiry** (↕) + **5 levels of student autonomy** (→)

	Level I	Level II	Level III	Level IV	Level V
Facet 1					
Facet 2					
Facet 3					
Facet 4					
Facet 5					
Facet 6					





Facets of Research Inquiry




In researching, students:

- **embark** on an inquiry and so **determine a need** for knowledge/understanding
- **find/generate** needed information using appropriate methodology
- **critically evaluate** information/data and the process to find/generate
- **organise** information collected/generated
- **synthesise and analyse** new knowledge
- **communicate** knowledge and understanding and the process to generate them.





Levels of Student Autonomy



Level I	Level II	Level III	Level IV	Level V
Students research at the level of a <i>closed inquiry</i> and require a <i>high degree of structure / guidance</i>	Students research at the level of a <i>closed inquiry</i> and require <i>some degree of structure / guidance</i>	Students research <i>independently</i> at the level of a <i>closed inquiry</i>	Student engages in <i>open enquiry</i> within <i>structures guidelines</i>	Student researches at the level of an <i>open inquiry</i> within <i>self-determined guidelines</i>





Semester 1 RSD Tasks

Literature-Based

1. RSD Diagnostic

- **O-week:** synthesis & integration of information, structured note taking

2. Lit RSD Task 1

- **Early Sem 1:** above (advanced)

3. Lit RSD Task 2

- **Mid Sem 1:** critical appraisal of scientific writing

4. Lit RSD Task 3

- **Late Sem 1:** source selection, information retrieval and referencing

Laboratory-Based

1. Lab RSD Task 1

- **Early Sem 1:** microscope-based

2. Lab RSD Task 2

- **Mid Sem 1:** above (advanced)

3. Lab RSD Task 3

- **Late Sem 1:** correlate micro- and macro-structural features

RSD Task Progression

As RSD Tasks progress, students gradually build on skills introduced in earlier tasks & are given increased autonomy over task directions & outcomes



Semester 2 RSD Tasks

Literature and Laboratory Based

1. Lit/Lab RSD Task 1 (Population Analysis Report)

- **Early Sem 2:** all semester 1 skills, BUT students:
 - Construct their own aim/hypothesis
 - Collect their own data
 - Analyse/synthesise data
 - Identify limitations/biases of study design

2. Lit/Lab RSD Task 2 (Mini-Symposium)

- **Mid Sem 2:** all above skills within group context

RSD Task Progression

As RSD Tasks progress, students gradually build on skills introduced in earlier tasks & are given increased autonomy over task directions & outcomes



Lit RSD: Diagnostic (O-week)

Marking Criteria using RSD Framework

	Level I	Level II
Facet of Inquiry	Students research at the level of a <i>closed inquiry</i> and require a <i>high degree of structure/guidance</i>	Students research at the level of a <i>closed inquiry</i> and require a <i>some structure/guidance</i>
1. Students <i>embark on inquiry</i> and so <i>determine a need for knowledge or understanding</i>	<input type="checkbox"/> Identifies some peripheral or duplicated ideas as key	<input type="checkbox"/> Identifies key ideas





Lit RSD Task 1: Note Taking, Synthesis & Integration of Scientific Literature (Early Sem 1)

Marking Criteria using RSD Framework

Facet of Inquiry	Level I Students research at the level of a <i>closed inquiry</i> and require a <i>high degree of structure / guidance</i>	Level II Students research at the level of a <i>closed inquiry</i> and require a <i>some structure / guidance</i>	Level III Students research <i>independently</i> at the level of a <i>closed inquiry</i>
1. Students embark on inquiry and so determine a need for knowledge or understanding	<input type="checkbox"/> Identifies some peripheral or duplicated ideas as key	<input type="checkbox"/> Identifies key ideas	<input type="checkbox"/> Identifies key ideas utilising all sources



Lab RSD Task 1: Microscopic observation of Cells (Early Sem 1)

Marking Criteria using RSD Framework

Facet of Inquiry	Level I Students research at the level of a <i>closed inquiry</i> and require a <i>high degree of structure / guidance</i>	Level II Students research at the level of a <i>closed inquiry</i> and require a <i>some structure / guidance</i>	Level III Students research <i>independently</i> at the level of a <i>closed inquiry</i>
1. Students embark on inquiry and so determine a need for knowledge or understanding	<input type="checkbox"/> Identifies an appropriate purpose / reason for lab activity	<input type="checkbox"/> Clearly and concisely identifies several principle purposes / reasons for lab activity	



**Lit/Lab RSD Task 1: Population Analysis Report** (Early Sem 2)**Marking Criteria using RSD Framework**

Facet of Inquiry	Level I Students research at the level of a <i>closed inquiry</i> and require a <i>high degree of structure / guidance</i>	Level II Students research at the level of a <i>closed inquiry</i> and require a <i>some structure / guidance</i>	Level III Students research <i>independently</i> at the level of a <i>closed inquiry</i>	Level IV Student engages in <i>open enquiry</i> , within <i>structures guidelines</i>
1. Students embark on inquiry and so determine a need for knowledge or understanding	❑ Aims / hypothesis not made explicit	❑ Aims / hypothesis not clearly stated or inappropriate	❑ Aims / hypothesis clear but adheres to guidelines	❑ Aims / hypothesis clear, focussed and innovative



Benefits for Students

- **Caters for all students regardless of their initial or current ability**
 - Addresses and remediates gaps in skill base
 - Extends more capable students
 - Fosters progression, i.e. everyone can improve
- **Clearly articulates expectations and standards**
- **Enables self-assessment against explicit criteria**
- **Enables better quality and more timely feedback**
- **Provides consistency of approach**
- **Provides an approach that can be adapted to other courses/disciplines where less guidance is provided**





Benefits for Staff

- **Facilitates clear linkage/mapping of teaching practices, assessment tasks and outcomes with course objectives and graduate attributes**
- **Less time required in the assessment process**
 - **Explicit task guidelines and expectations fewer student → queries**
 - **Better and more timely feedback**
- **Allows assessment of process as well as content**
- **Increased student engagement with course materials**
- **Reduced incidence of poor practice**
 - **Drop in plagiarism**
 - **Evidence of more critical analysis of sources for scientific validity and credibility**



RSD Framework:

a systemic approach better preparing undergraduate students for research in further university studies or employment?



Thank you
Questions?

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