Moving towards constructive alignment in First Year Biology

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Talk plan
1. Discuss the poor learning outcomes in BIO1AD
2. Outline the idea of Constructive Alignment
3. Look at some examples of constructively aligned teaching/learning activities in BIO1AD


<table>
<thead>
<tr>
<th>Assessment task</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory exam</td>
<td>51 (55%)</td>
<td>52 (57%)</td>
<td>50 (46%)</td>
</tr>
<tr>
<td>Practical exam</td>
<td>44 (35%)</td>
<td>42 (29%)</td>
<td>48 (42%)</td>
</tr>
<tr>
<td>Scientific reports</td>
<td>71</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>Laboratory work</td>
<td>80</td>
<td>77</td>
<td>82</td>
</tr>
<tr>
<td>Final mark</td>
<td>55 (79%)</td>
<td>53 (65%)</td>
<td>53 (68%)</td>
</tr>
</tbody>
</table>

One student’s perception of the practical exam

The practical examination assessed...One's capacity to draw excellent specimens in an incredible limited time frame, labelling, lots of memory work and a small amount of the actual understanding of what we are labelling. All of which to be done under great pressure.

Response to an email survey sent out after the practical exam.

Why remove the practical exam?

- Students have little experience with practical examinations
- Duplicates assessment of dissection & drawing
- Questions assess ability to memorise facts and low levels of understanding
- Logistically difficult to organise

The new assessment scheme

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Value in 2006</th>
<th>Value in 2007</th>
<th>Breakdown of marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical exam</td>
<td>30</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Final exam</td>
<td>50</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Theory section</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Practical section</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Scientific reports</td>
<td>10</td>
<td>15</td>
<td>1st attempt = 5, 2nd attempt = 10</td>
</tr>
<tr>
<td>Dissections</td>
<td>3.3</td>
<td>5</td>
<td>1st attempt = 1, 2nd attempt = 3.3</td>
</tr>
<tr>
<td>Drawings</td>
<td>3.3</td>
<td>5</td>
<td>1st attempt = 1, 2nd attempt = 3.3</td>
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<td>Homework Ass.</td>
<td>3.3</td>
<td>5</td>
<td></td>
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</table>
Learning objectives were developed for the practical course

Phylum Porifera
Examples of objectives of this practical class

Practical skills
To practise using a compound light microscope and dissecting microscope. To draw various sponges accurately, clearly and neatly. Sections relate to the whole animal.

Conceptual learning
To recognize the diagnostic characteristics of the Phylum Porifera. To identify external features and internal structures of a sponge which are involved in feeding.

Mean mark (pass rate) for each assessment task

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<th>2007</th>
<th>Change?</th>
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<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>31 (53%)</td>
<td>55 (67%)</td>
<td>Pass rate inc by 14%</td>
</tr>
<tr>
<td>Practical section</td>
<td>37 (21%)*</td>
<td>37 (23%)</td>
<td>Little change</td>
</tr>
<tr>
<td>Practical work</td>
<td>69</td>
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<td>Little change</td>
</tr>
<tr>
<td>Scientific reports</td>
<td>80</td>
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* Mean mark and pass rate for 2006 only.

Theory questions were easier in 2007

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Constructive alignment

Biggs (1996) brought together two fundamental principles of education:
1. learning results from what the learner does
2. teaching that encourages and supports student activities that will achieve the unit’s learning objectives is effective teaching.

Web of consistency

All components of the system (objectives, activities, assessment) address the same agenda and support each other

The teacher’s job is to trap the students into learning

Schuell (1996)
“...what the student does in determining what is learned is more important than what the teacher does.”
The constructive alignment design framework

1. Decide on the learning objectives.
2. Choose teaching/learning activities which get the students to do the things that the objectives nominate.
3. Choose assessment tasks which get students to show evidence of the learning stated in the objectives.

Example 1: Scientific report writing

Objective: To write a scientific report
T/L activities: Training workshop with LAS
Students write 2 reports
Assessment: Report 1 (5% & feedback)
Report 2 (10% & feedback)

Constructive alignment!

Example 2: Animal diversity

Objective: To be able to classify an animal into its phylum by recognising the diagnostic features of each phylum.
T/L activities: Lectures
Practical classes

T/L activities: Practical classes
One phyla per class e.g. Mollusca
Dissect a snail
Draw the dissection
Label external and internal structures
Look at examples of other types of mollusc

Example 2: Animal diversity

Objective: To be able to classify an animal into its phylum by recognising the diagnostic features of each phylum.
T/L activities: Lectures
Practical classes
Assessment: Final exam
Practical section
Theory section

An alternative approach

T/L activities:
Pre-lab
Students create their own table of diagnostic features of the animal phyla.
In class
Students look at unknown specimens and assign each to a phylum.
Students write a short justification of the classification.
An alternative approach

Objective: To be able to classify an animal into its phylum by recognising the diagnostic features of each phylum.

Assessment:
- Correct classification
- Correct use of diagnostic features to classify

Constructive alignment!

Acknowledgments

Brian Malone – unit coordinator of BIO1AD