Approaches to study and conceptions of biology: differential outcomes for generalist and vocational degree students

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Introduction

Interest and intention can influence students' approaches to learning (Entwistle & Peterson 2004). Our goal is to deliver a first year biology curriculum that is both (1) deep and engaging for those intrinsically interested and continuing in biology, and (2) broad and relevant for students enrolled in vocational degrees.

We evaluated our learner profiling method as a means to inform our first year biology curriculum design, which must be suitable for our diverse cohort of students across a broad range of degree programs, i.e. generalist and vocational degrees.

Questions:

1. How do students' approaches to learning (Learner Profile) change over the semester?

2. Do students enrolled in vocational (professional) degrees engage with our curriculum differently from students enrolled in generalist degrees?

Methods

1. First year biology students were profiled according to their approach to learning at the beginning and end of the semester (Quinnell et al. 2012).
2. Students were also identified as 'generalist' or 'vocational' based on their degree program and mapped onto Biglan's 1973 matrix (Fig. 1).

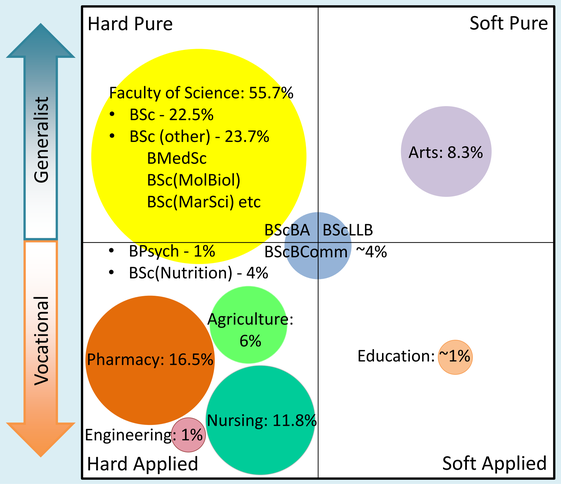

Fig. 1. Diversity of degree programs of our first year students (n = 1485 in 2005) mapped onto a modified version of Biglan's discipline matrix (Biglan 1973).

3. Sequential hierarchical cluster analyses and *post-hoc* tests were used to evaluate how Learner Profiles changed over the semester.
4. End of semester Unit of Study questionnaire data were used to see how elements of the curriculum (Ramsden, 1991; see Table 1) correlate with the changes in Learner Profile.

Results

1. Students' parameters change significantly from the beginning to the end of the first semester (Table 1, Fig. 2).
2. Students enrolled in generalist degrees (56% of entire cohort) demonstrated greater engagement with our biology curriculum than those enrolled in vocational degrees (Fig. 2).
3. Our data provide some evidence that our curriculum: a) supports generalist degree students whose conception of biology is sound and whose study approach is intrinsic; b) is less than ideal for meeting the needs of students in vocational degrees who do not have deep approaches to learning; and c) has failed to engage students who demonstrated dissonance at the start of semester (Fig. 2).

Table 1. Mean sub-scale scores for *approach to study*, *conception of biology* and *unit of study evaluation* of first year biology students at the beginning and at the end of semester (n = 597).

	Sub-scale[1]	Mean Likert sub-scale score: Beginning semester 1	Mean Likert sub-scale score: End semester 1	Change in scores over semester
Approach to studying	Surface (14 items)	3.2	3.4	Shift to increase in surface approach to learning **
	Deep (14 items)	3.5	3.2	Tending to neutral **
Conception of biology	Fragmented (10 items)	2.9	3.0	Tending to neutral **
	Cohesive (10 items)	3.9	3.8	Tending to neutral **
Unit of Study experience questionnaire	Clear goals (5 items)		3.0	Neutral
	Independence (6 items)		2.6	"Disagree" that the level of independence was appropriate
	Good teaching (6 items)		3.0	Neutral
	Workload (5 items)		2.7	"Disagree" that the level of workload was appropriate
	Assessment (6 items)		3.2	"Agree" that the level of assessment encouraged deep approaches to learning

[1]number of items in each sub-scale indicated in brackets; ** P < 0.01

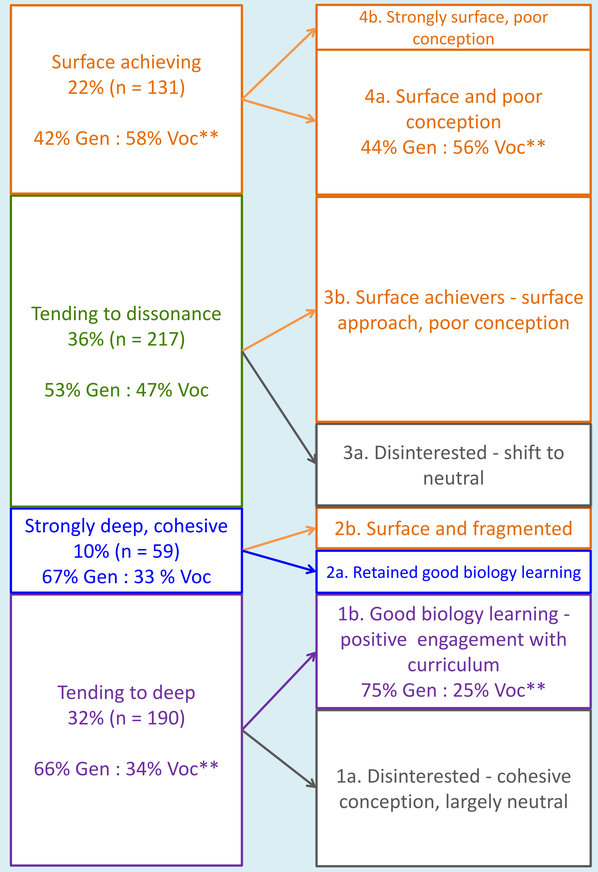

Fig. 2. First year biology student learner profiling showing changes over the semester, and ratios of generalist versus vocational degree students for different orchestrations. ** P < 0.01

References

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Acknowledgements

The early stages of this research were funded in part by a University of Sydney Science Faculty Educational Research Grant (2007). The investigation was conducted under the approval of the University of Sydney Human Ethics Research Committee.

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Conclusions

Our findings show major shifts in profiles over the course of one semester in our first year biology students, and differences in engagement between generalist and vocational degree students.

Our findings suggest that a course in biology literacy would be more suitable to students in vocational degrees and a course that is biology content-rich would suit our generalist degree students.