Using Online Assessments to Support Acquisition of Problem-Solving Skills in Biochemistry

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OLAAF

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Using problem solving to help understanding

- 1993 - introduction of "problem-based learning" approach to 2nd year Environmental Biochemistry course (based on medical model & Maastricht 7 jump approach)
- Now - Bodner & Domin (after Wheatley):
  (Trial & Error Anarchistic Approach)
  - Read the problem
  - Now read the problem again
  - Write down what you hope is the relevant information
  - *Draw a picture*, make a list, or write an equation or formula to help you begin to understand the problem
  - Try something
  - etc

Comparison of Cognitive Taxonomies

	Bloom	Imrie
HOCS	Evaluation Synthesis Analysis	Problem-solving Application
	Application	
	Comprehension	Comprehension
LOCS	Knowledge	Recall

Cognitive Skills

Problem versus Exercise
Does it need HOCS or only LOCS?

A Problem:
- "Solving a problem is what you do when you don't know what to do" (Wheatley).
- Requires HOCS

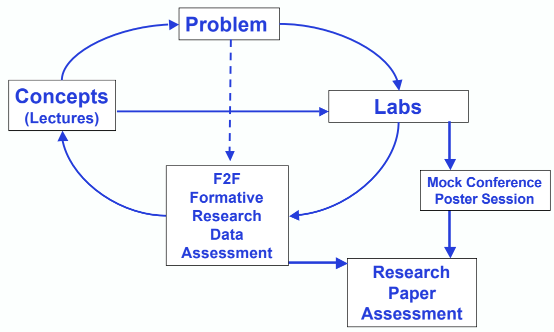
An Exercise:
- "If we know how to get to where we want to be, we are faced with an exercise, not a problem" (Bodner)
- Needs only LOCS

- Working through an exercise requires application of an algorithm, whereas with a problem, there is no immediately obvious algorithm to apply.

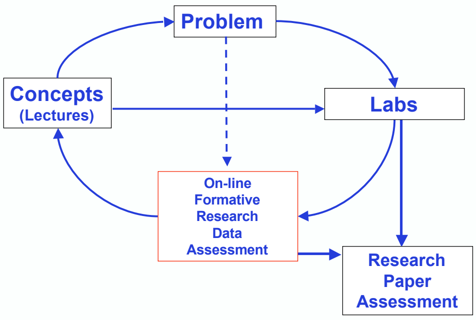
Biochemistry Mapped to RECAP

- REcall:
  - metabolic pathways: identifying missing features.
- Comprehension:
  - metabolic pathways: what would happen if ---?
- Application:
  - assays of individual enzymes in a metabolic pathway.
- Problem solving:
  - effects of environmental stress on a metabolic pathway
  - formulating hypotheses
  - quantitative analysis of data
  - possible explanations of data
  - suggest experiments to provide additional data

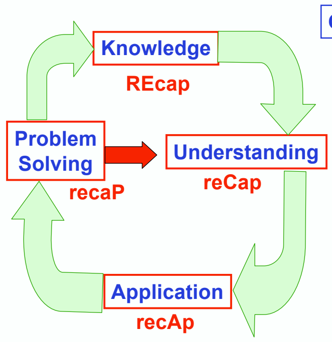
Approach until 2003/04



Replacing F2F in 2004/05



Building Problem Solving Ability



Can we assess on-line?	
REcap	YES
reCap	Partly
recAp	Mostly
recaP	Partly

Will students use OLAAF?

Use of other on-line support

Use of Online Support	
Use daily	17%
Use weekly	28%
Used > 5 times	13%
Used 2 – 5 times	14%
Used Once	5%
Not used	23%

Final Performance		
Final mark (%)	Students using (%)	(N)
60 – 100	67	(19)
50 – 59	25	(16)
0 – 49	0	(39)

Conclusions:
1. On-line support used most by students who don't need it
2. On-line support needs improved design – active not passive

Will OLAAF make a difference?

Coursework Marks Range %	N = 93	Average Coursework Marks %	Average OLAAF Marks %	CW/OLAAF Ratio	Students taking OLAAF %	Attendance at Lab Sessions %
25 – 39	4	28.5	62	0.5	33	55.6
40 – 49	11	46	63.4	0.7	56	77.8
50 – 59	36	54.8	68	0.8	80	86.7
60 – 69	34	64.1	68.4	0.9	90	95.7
70 +	8	74.3	72.5	1.0	90	96.3

Conclusions:
1. On-line support used most by students who don't need it.
2. Performance correlates with student engagement – formative OLAAF did not influence student engagement.
3. Formative on-line assessment over estimates student ability at problem-solving