

Effective feedback to students

Stephen J. Swithenby

The Open University, Milton Keynes MK7 6AA

s.j.swithenby@open.ac.uk

Formative Assessment in Science Teaching

Agenda

- Assessment and feedback
- Criteria for effective feedback
- FAST studies
- Reflection

EVALUATE EFFECTIVE
IMPROVING
IMPLEMENT DEVELOP
ASSESSMENT LEARNING
PROGRESSION

Question 2

- a)i) 1. Isolate plasmids from a pure culture of the host. ✓
 2. Treat with a restriction endonuclease that cleaves each plasmid at the same site. ✓
 3. Digest the *P. abyssi* DNA with the same restriction endonuclease. *isolate DNA from P. abyssi containing AP gene.*
 4. Mix opened plasmids and *P. abyssi* DNA fragments. *same point*
 5. Add the enzyme DNA ligase to join them together, creating recombinant plasmids. ✓
- ii) Chromosomal DNA from the host is digested with restriction endonuclease and the DNA fragments are inserted into the plasmid upstream from the *P. abyssi* AP gene. *1/2 the same as above*
 Those plasmids that now include a strong promoter from the host DNA will produce the alkaline phosphatase and can be selected for. *(i) 4/5 (ii) 2/5*
he reporter gene gives a method of selection 02/11
no, E2 is 6/10 reporter gene E2
- b)i) 1. The recombinant plasmids are mixed with the host cells in the presence of calcium ions. ✓
 2. The calcium ions make the bacteria's cell wall more permeable to plasmids so the recombinant plasmids are taken into the cell. *yes*
 3. The host cells grow and replicate with the recombinant plasmids inside them, so they also replicate. This produces a clone of identical cells containing the recombinant plasmid. *(i) 3/3 (and the inserted AP gene)*
- ii) I would insert the *P. abyssi* AP gene into the plasmid pSJS1240 and then insert the recombinant plasmid into the *E. coli*. I would then select those cells that produced the alkaline phosphatase and the required tRNAs. *(ii) 1/2*
but his doesn't E3 have the strong promoter. you only need to transform with the 2 plasmids simultaneously
- iii) The *E. coli* with pSJS1240 yielded the most AP as it contains sufficient AGG and AGA tRNA molecules to synthesize AP. As *P. abyssi* has high amounts of AGG and AGA codons in its genome it is likely that these codons occur in the AP gene. As AGG and AGA tRNA molecules are rare in *E. coli* the number of them present will restrict the rate of AP synthesis. The pSJS1240 plasmid encodes for these tRNAs and so cells containing these plasmids will produce more AGG and AGA tRNA molecules and so can synthesize AP at a higher rate. *(iii) 4/7*
as here is not enough arginine present 02
- c)i) The vector used is yeast artificial chromosomes (YAC). *Q to total = 8/12*
- ii) Some yeast proteins are secreted naturally. The coding sequence for the signal peptide of one of these proteins is cloned immediately upstream of from the protein that is to be secreted and it will be moved through the intracellular membranes and secreted from the cell. *2/3*
injection point of the
- d)i) Almost all of the AP is in the supernatant rather than in the cells therefore it was secreted out of the cells. ✓
little AP activity in the cells
d(i) 2/3 02

Assessment is the curriculum

‘... if we wish to discover the truth about an educational system, we must first look to its assessment procedures’ (Rowntree 1987)

Learning is influenced by assessment rather than teaching (Snyder 1971, Miller and Parlett 1974, Sambell and McDowell 1998)

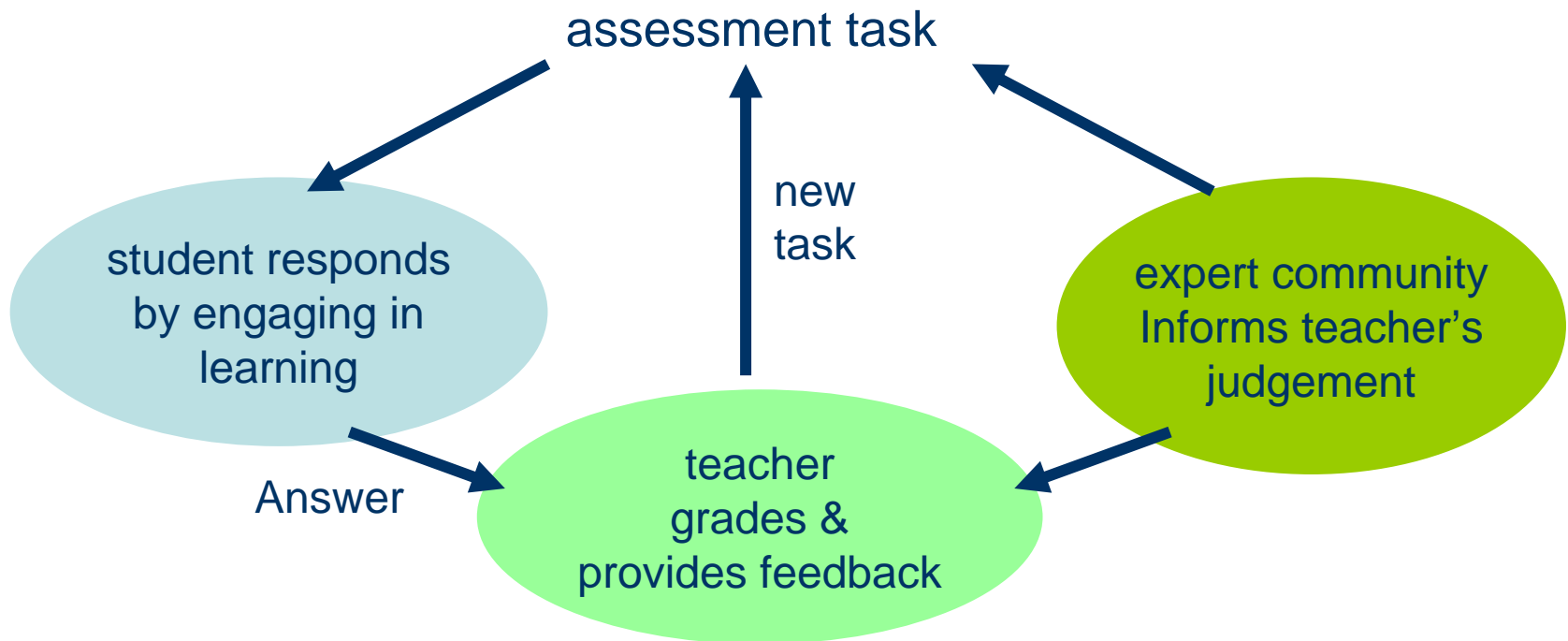
Assessment and learning

Conflicting models and assumptions

Teach and test	or	Learn and achieve (Segers et al 2003)
Surface learning	or	Deep learning
Knowledge transmission	or	Knowledge construction (Laurillard 2002)

Assessment and feedback for learning

A constructivist model



Conditions for effective feedback

Students must

know the goal/standard.

compare performance with the goal.

take action to close the gap.

Sadler 1989

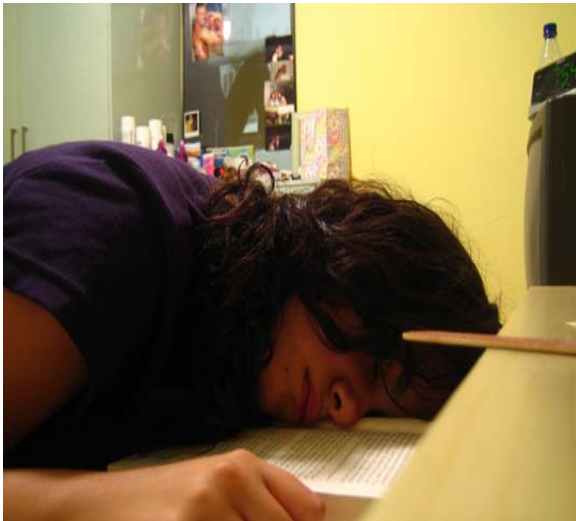
Effective feedback practice

- Facilitates self assessment.
- Encourages dialogue round learning.
- Clarifies what good performance is.
- Provides opportunities to close the gap.
- Delivers high quality information to students.
- Motivates and builds self esteem.
- Provides information to teachers.

Assessment for learning

Framework (Gibbs and Simpson 2004) developed from theoretical and empirical analysis within a constructivist model. Issues are;

Engagement



Feedback



Assessment for learning

Engagement and feedback issues unpacked

Quantity and Distribution of Student Effort

Quality and Level of Student Effort

Quantity and Timing of Feedback

Quality of Feedback

Student Response to Feedback

11 conditions tested using a standard questionnaire

Assessment for learning

- Feedback is provided often enough & in enough detail
- Feedback is provided quickly enough to be useful to students
- Feedback focuses on learning rather than on marks or the students themselves
- Feedback is linked to purpose of assignment & criteria
- Feedback is understandable to students
- Feedback is received by students and responded to
- Feedback is acted upon by students to improve their work or their learning

FAST project and approach

- Assessment experience questionnaire
- Follow up surveys, interviews etc. (e.g. perceptions of feedback questionnaire, written feedback coding tool etc)
- Tailored reform
- Evaluation

Example FAST data

Brown et al (2003)

Questionnaire section	Agree or Strongly agree	Disagree or strongly disagree
Quantity and timing feedback e.g. I get plenty of feedback on what I am doing.	74%	12%
Quality of feedback e.g. The feedback helps me understand things better.	74%	13%

Is feedback used?

Positive responses drop to ~60% when students are asked about active use of feedback.

I look at the marks and then put the script in a drawer in case it is useful for revision.



FAST follow up

Typical conclusions

- Students make limited use of the assessment
- Written feedback doesn't encourage feedforward
- Feedback may too slow to be useful
- Informal feedback may not be recognised
- Course design may not promote use of feedback

Hence, targeted reform

Reforms implemented

Examples

- Speed of feedback (computer based)
- Introduction of peer assessment
- Focused feedback
- Greater emphasis on feedforward
- Target setting to encourage engagement with feedback
- Opportunity for immediate response to feedback

Computer based feedback

Improvement in the speed of feedback

Individually tailored

Anonymity may suit anxious students

24/7 availability

Reduced marking demands

Course design can make use of speed etc to encourage
student engagement with feedback

Formative Assessment in Science Teaching

OpenMark

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OpenMark: Diagram labelling (biology example) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Address https://intranet-gw.open.ac.uk/its/openmark/DD_DiagramLabelling01.html Go

Colour coded sentence completion

Diagram labelling (biology example)

Diagram labelling (economics example 1)

Diagram labelling (economics example 2)

Diagram labelling (chemistry example)

List ordering

List completion

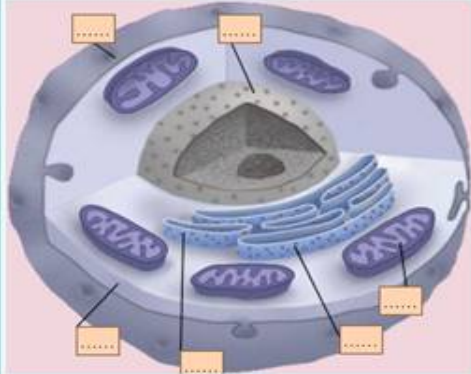
Table completion.

Label the diagram by dragging boxes into the blanks on the diagram.

This example question is taken from *Are you ready for S204?*

Question 5

Drag and drop the structure labels to the correct boxes on this animal cell.



- cell membrane
- cell wall
- chloroplast
- cytosol
- mitochondrion
- nucleus
- ribosome
- rough endoplasmic reticulum
- vacuole

check redo

Drag and drop the boxed words, then click on check or press Enter when complete. 1 of 1

Overview Numeric Input Text Input Multiple Choice **Drag and Drop** Live Diagrams Diagram Interpretation IMS Miscellany

Applet AppletMain started Internet

start Teaching presentations work Assessment for Learn... OpenMark: Diagram I... 11:03

Maths for Science

S151 Practice Assessment - Microsoft Internet Explorer provided by The Open Univer...

File Chapter Help

Chapter 3 Question 5

You have one more attempt at this question.

If $L = 6.1 \times 10^{30} \text{ W}$ and
 $F = 4.9 \times 10^{-10} \text{ W m}^{-2}$, find d in the
equation

$$d = \sqrt{\frac{L}{4\pi F}}$$

You should give your answer in
scientific notation, with the correct
number of significant figures and the
correct SI base units. *N.B. You do not
need to understand the underlying
science or the units used in order to
answer this question.*

$d =$

Normal Superscript

Your answer is still incorrect.
You have given your answer to an incorrect number of
significant figures.
In addition, the units you have given are incorrect.
Significant figures and rounding in calculations are
discussed in Section 3.1.2.
You can use the units given for F and L to work out the
correct units for d (see Section 3.5.4).

ok

Click on 'ok' or press Enter

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Reflection

Quantity and Timing of your feedback

Quality of feedback

Student response to feedback

How do you know?