



Enhancing Lab Skills through reflective Practice

Practical Report or Practical Separation

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Bioscience employers continue to demand graduates with better practical competence.

Respondents were asked whether the skills gaps which had been identified across new recruits in the 2005 survey were still problematic. The responses confirmed that in only a few instances had skills improved.

Skill	Association of the British Pharmaceutical Industry				(n)
	concern	concern	concern	problem	
practical experience	27	13	5	1	46

The average undergraduate science student engages in around 6 hours of practical work per week (Collis 2007)

high level maths					
scientific knowledge	9	28	4	1	42
communication skills	7	15	12	13	47
team working	4	9	18	13	44

Our hypothesis is reflected in a key comment from this study:

“I’m not really worried about what happens in the practical as long as I’m getting good marks on the write up”

recommendations center around re-designing
practicals

- Enquiry-based learning (EBL)
- Including ‘cutting edge research’ in undergraduate laboratory classes
- E-learning in support of laboratory classes

David Adams (2009)

We approached the problem from
a different angle

In the wider literature

- Deeper learning is associated with reflection (Biggs 1999 and many others):
 - But using reflection to deepen learning within a practical setting has rarely been reported
 - Although in the clinical setting this practice is common place through ‘critical incident analysis’
- learners reflect on a critical incident that occurs in a specialist setting, and analyse the factors that contributed to either successful or negative outcome in a particular regimen.

We propose that

Reflection through critical incident analysis can be used to deepen students learning in the practical setting and therefore address some of the skills deficits identified by employers

What we did

- Using a second year 'laboratory skills' course with a smallish cohort (n=25) students
- Which is assessed 'conventionally' through practical reports and a laboratory diary
- We introduced a "Critical Incident Analysis" form
- Recall the practical itself, events that had played a significant part in its *success* or *otherwise*
- The overarching aim is to 'inform learning through practice' (Reid 1993 p. 305)

The critical incident form

Name:

Practical:

Date carried out:

Location:

Did the practical generate the outcomes intended and explain your response:

List the critical incidents in this protocol:

Considering each of the items listed above, briefly reflect (honestly) on how the practical was carried out at each of these stages:

Following the above reflection what have you established to be the critical incident?

Write 3 bullet points that illustrate how your reflections on this practical will affect your future behaviour in the laboratory context in the future:

Include what you were thinking and feeling at the time – style shift!

Critical but honest

Relate theory to practice

feed forward

How we assessed the intervention

At the start of the year:

- Students filled in a questionnaire using the Personal Response system (anonymous responses)
- Questions based on students attitudes towards reflection and practical work
- Questions were adapted from an [on line resource](#)
- Questionnaire was re-visited at the end of the year

Some key Findings from the questionnaire:

question	at start of intervention	at end of intervention
most important attribute of a scientist? (to be skilled in the lab)	44	18
enjoyed lab work	84	84
practical work to be a stimulating way to learn	88	90
followed the schedule without knowing what they were doing	72	52
reflected on the practical once it was over	84	64

After the first round of reflection

We ran a focus group to gather qualitative explanation of some of the quantitative data

I think <reflection> it's just writing what you did wrong and what you can do better that's what I think it is but I'm not sure

I think the way you reflect on it is looking at what the tutor writes once you have done it and you've written it

Student voice about reflection in general

Yeah I think all you're thinking about is a particular assignment and trying to get the best grades in that assignment and the incident form it just seems like a really irritating part at the end. You know you're just trying to maximize the time you've got to get the best grade

Student voice
about this
activity

I do my assignment that
obviously comes first

The Clincher?

“we’re not really judged on what we do in the labs it’s what we do afterwards in terms of writing it up so that’s what you want to concentrate on ... your write up and what grade you get for it. I’m not really worried about what happens in the practical as long as I’m getting good marks on the write-up”

Focus groups repeated at the
end.....

It <reflection> is giving yourself feedback

Reflection will help us to save time and money in the workplace

**Student voice
about reflection
in general**

It would help to have a discussion to help us think about what went wrong

It would help if it was part of the session, I would think more about it

Student voice about this activity

From our results

- Initially students clearly did not understand the term reflection
- And did not value it as part of the learning cycle; they felt that the critical incidence analysis was a repeat of the 'limitations' of the practical.
- Yet by the end they accepted its relevance, but were reluctant to engage as it was not part of the formal assessment

The dominant view was that tutor feedback, linked to assessment was the most significant tool through which to enhance learning. Students felt that they wanted to use their time to enhance their grade, the critical incidence form was an extra that detracted from the time available to gain additional assessment marks.

Our results are not as we
expected

We seem to be **widening the gap**, students place
emphasis on theory rather than practice

Suggestions for future development

- Ruble and Lom (2008) report the use of Online Protocol Annotation – annotating on line practical protocols
- Use of peer support – students could carry out the critical incident report in the laboratory with their practical partner
- Incorporate this reflection into the assessment more formally, redressing the balance between theory and its practical application. Speake, Foster and Henery (2007) report a similar assessed ‘practice portfolio’ for final year bioscience students

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