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Context/Problem-Based Learning in Chemistry – Sharing Lessons Learnt & Making it Work

Context/Problem-Based Learning (C/PBL) uses real world contexts and problems to encourage students to take control of their learning. The following summary represents a reflective overview of what we have learnt as developers and practitioners of C/PBL, together with some practical guidance for those interested in using C/PBL in their teaching.

Lessons Learnt

As developers and practitioners of C/PBL, we have found that it works well in chemistry when...

1. **teaching at all levels** – C/PBL activities have been developed for chemistry students at different levels, from Foundation Degree to Masters (MSc or MChem). C/PBL is not an 'advanced' approach, and can work well throughout all stages of a teaching program.
2. **it's integrated not isolated** – Like all good teaching, C/PBL works best when fully integrated alongside other teaching. C/PBL is less effective when simply 'bolted-on'.
3. **students contribute and give feedback** – Students readily recognise that C/PBL encourages them to apply their knowledge in real world contexts and that it gives them the opportunity to develop the types of interpersonal skills essential in the workplace. C/PBL group work can also help students make friends and hence adapt to life at university.
4. **tutors want to enhance their teaching** – C/PBL is attractive to tutors who wish to diversify their teaching skills, particularly with respect to encouraging collaborative learning. Tutor feedback from 'C/PBL in Chemistry' workshops has always been positive.
5. **used in the laboratory** – C/PBL laboratory work provides students with a motivating practical work experience that complements the skills learnt through traditional 'recipe-style' investigations. C/PBL laboratory work is particularly effective at encouraging students to contribute to experimental design and reflect on outcomes.
6. **implementation is well organised** – The success of C/PBL in chemistry is highly dependent on the skills and motivation of the tutor and training is considered key to its success.
7. **sufficient resources are allocated** – Despite its demonstrable benefits, C/PBL in chemistry is resource intensive, initially for development of materials, and sometimes, in terms of contact time.
8. **assessment methods match the teaching style** – Performance in C/PBL assessments usually parallel those found for traditional teaching approaches. When performance is not as good this is linked to students' lack of familiarity with the assessment methods.

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Making it Work

If you are interested in using C/PBL in your own chemistry teaching, here are some practical tips that we have found useful:

1. **Use and customize existing teaching material and C/PBL resources** – A lot of traditional teaching material can be readily modified into a C/PBL format. C/PBL resources have been developed in many areas so using existing materials is a low-risk first step.
2. **Take advantage of internal or external 'Champions'** – It helps to have C/PBL 'Champions' who can promote C/PBL and mentor newcomers and help demystify the process.
3. **Prepare a teaching guide for facilitators** – Material should include: a summary of the learning objectives, a timescale of expected student progress, a marking scheme, and an explanation of how C/PBL works and the role of the facilitator.
4. **Make use of trained postgraduate students as facilitators** – Postgraduate students are effective guides to undergraduate students going through the C/PBL process.
5. **In the first session explain how C/PBL works** – Since C/PBL may be unfamiliar to students, start by explaining what is expected of them and the benefits of this approach.
6. **Use a diverse range of assessment activities** – Activities could involve posters, oral presentations, and practical work. Note, many C/PBL problems don't have single, or pre-determined correct solutions,
7. **Make full use of available technology** – Students can collaborate electronically using wikis, forums or a virtual learning environment.
8. **Use peer assessment** – Students' assessment of each others contribution to the group work can be used to assign individual marks.
9. **You don't have to change the world** – Just try a session or two at first! Don't expect to get it totally right first time. C/PBL material evolves and may undergo numerous iterations before being considered 'finished'.
10. **Use a mixed approach** – C/PBL is most effective when used alongside traditional teaching methods.

Find out more - For example of resources go to
http://www.heacademy.ac.uk/physsci/home/networking/sig/CPBL

For a discussion of context and problem-based learning see article in
http://www.heacademy.ac.uk/assets/ps/documents/new_directions/new_directions/newdir3_link.pdf