

# Creating a bank of inquiry-oriented resources for large first year classes in Chemistry (Flinders University)

**Susan Pyke, Flinders University**

**School of Chemical and Physical Science, Flinders University**

The aim of this project was to create an inquiry-oriented resource bank to assist students in building confidence in their abilities to deal with fundamental concepts of chemistry. This resource bank was focussed on meeting students from large and increasingly diverse first year chemistry classes around key areas of chemistry, where reinforcement, further elaboration and practise would be beneficial. Inquiry-oriented activities were chosen with the aim of encouraging the students to take control of and gain enthusiasm for their own learning, and to foster interactions with peers around key areas of chemistry. The issue of many students lacking in confidence in their abilities with core chemical concepts has been made clear to both students and staff through a Key Competency testing program which has run at Flinders University since 2006.<sup>1-3</sup> Identifying these areas has afforded opportunities to increase academic support for our first year students, and strategies including conversations between academic staff and individual students around key areas identified by the test, opportunities to reassess Key Competencies and 'drop-in' tutorials which are student directed and extend beyond key areas have become part of our first year chemistry topics. The 'drop-in' tutorials provide an ideal opportunity (location, time etc.) to have activities available for use by willing students (attendance is voluntary) with some academic support and encouragement available if needed. The resource bank of activities will enhance the opportunities for consolidation, investigation and extension of students understanding of and confidence with key chemical concepts. These activities will be available to the students in the "drop-in" tutorial room for either group or individual use.

2012 saw an abnormally large increase in the number of students in our Introduction to Chemistry topic (an increase of more than 30% over the previous year). These extra students had serious implications on my time for this project and I found I was not able to develop activities in the timeframe expected. Several activities involving writing and interpreting chemical formulae and balancing reactions, along with activities involving oxidation numbers and balancing redox equations are currently being developed but have not yet been trialled. In week 1 of semester 2, 2012, 25 students transitioning from Introduction to Chemistry to the higher level Chemistry 1 worked through a 'POGIL type' (Process Oriented Guided Inquiry) activity covering two areas (basics of acid – base chemistry and ways of representing organic structures). This activity was designed to assist the students to bridge the gap into the higher level chemistry topic and be confident in their abilities. A short feedback survey at the end of the workshop assessed the student experience. The students reported increased confidence with their ability to cope with the more challenging topic and an easing of their trepidation about the standard required. They were also able to interact with peers studying at least two common topics and start friendships and find study partners that in some cases

continued after the session. The session was held in the 'drop-in' tutorial room which some of them had not attended before and many then continued to attend. The need for more activities such as these which along with improving concept understanding will hopefully lead to group discussions and/or peer mentoring is clear. Students show independence in even attending voluntary sessions and hopefully this independence and confidence in their own learning abilities will be fostered through completion of these inquiry based activities. Discussions with students have shown they would be keen to undertake these types of activities and also willing to be involved in groups such as focus groups to evaluate the activities and evaluation of performance in assessment tasks. So more activities are needed to trial and evaluate their impact. The potential benefits of this resource bank of activities has been recognised not only by Assoc. Prof. Les Kirkup in his support of this as an AFFA but also within Flinders University by funding of a DVA's transition/retention program grant. This centres on the development of the 'drop-in' tutorial room into a modern first year 'learning space' where a range of activities and resources will be made available to assist first year students in both Chemistry and Physics both academically and with their transition to University study. Financial support for this project includes funding to employ a project officer to assist in the development of the resource-bank started with the AFFA project (now encompassing both Chemistry and Physics), and also to develop extension activities to encourage engagement with the disciplines beyond the core material of the disciplines. The School of Chemical and Physical Sciences is supporting this idea by the provision of two large tutorial rooms for the use of first year students, and providing staff to encourage and assist student learning and foster enthusiasm for science.

Being part of the AFFA Initiative has provided several valuable opportunities. Firstly the opportunity to be mentored by an experienced and passionate science educator in Les Kirkup who has been always keen to support our endeavours enthusiastically has been brilliant. Secondly being part of a national network of inquiry based science education researchers (facilitated by Les) with a range of discipline specific interests but common goals, and the opportunity to hear about the research endeavours within the group and to discuss our projects together particularly at the inquiry day in September 2012 was extremely encouraging and informative. The interest shown by those outside my University was encouraging personally. The fact that someone outside the my own institution was sufficiently interested in my education based research project to support it both through mentoring and financially, has helped to raise the profile of my work within my own school. This has been particularly helpful as during the course of this project I have transferred into an education focussed role at here at Flinders University and have recently been appointed as Director of First Year Studies for the School of Chemical and Physical Sciences. Being part of the AFFA initiative has led to many contacts, particularly with Les Kirkup which will continue to be productive into the future. It has also provided a useful stepping stone to both encourage and enable me to apply for further funding which will result in a valuable resource for first year students in Chemistry and Physics at Flinders University.

1. "Key Competency Tests in a large First Year Chemistry Cohort" S. G. Pyke, A. V. Ellis and J. G. Shapter, FYHE, Adelaide, June 2010.
2. "Identifying students at risk and providing students with immediate personal feedback in large first year Chemistry topics" S. G. Pyke, RACI ChemEd 2012, Adelaide, July 2012.
3. "Enabling chemical conversations: Investing five minutes with First Year Students", S. G. Pyke, ACSME, Sydney, September 2012.