

## Enhancing Science Learning with ICT

(previously entitled Getting the most of ICT in supporting IB Diploma Science Teaching in the Laboratory)

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### Description

This three-day workshop is aimed at IB Diploma science teachers who wish to be fully equipped to meet and exceed the ICT requirements of the IB Diploma programme. Participants will need to bring with them their own wireless enabled laptop on which to work and participate. The workshop is designed to provide opportunities for participants to examine and discuss a range of simulation, spreadsheet, database, graphing and data logging activities in Diploma Sciences. A particular focus will be how best to integrate these activities within the scheme of work, and given the wide range of alternative ICT activities, making appropriate choices of activity for a given learning sequence.

This workshop has been designed around the needs of teachers of chemistry, physics and biology and sessions will have activities tailored to the needs of each.

### Session 1: Using Moodle, a virtual learning environment for hosting student activities and far more

Commencing with a survey of Moodle's capabilities we examine how students can be provide with online support, their learning scaffolded and ICT based activities delivered in a stimulating electronic environment that encourages students to work with each other electronically, using tools that are already familiar to them, particularly blogs and online messaging. We explore how course content can be created and delivered through Moodle.

### Session 2: Use of Spreadsheets with scientific data

Participants will have a range of different experiences with spreadsheets, and a variety of activities are introduced ranging from basic use of spreadsheets to progressively advanced uses with activities situated in biology, chemistry and physics.

### Session 3+4: Data acquisition (data logging)

We introduce a variety of scenarios where data acquisition can be introduced to students, and together with more complex applications in colorimetry, gas sampling, health analysis, and motion and sound. LabView is introduced as a visual programmable language for data acquisition, intended for both data acquisition and control.

### **Session 5: Evaluating ICT resources and choosing the resources to use in a learning sequence**

A discussion session looking at reasons for choosing between a range of simulations and other resources in supporting and enhancing science learning.

### **Session 6: Accessing and using databases**

Starting out from using spreadsheets to plot graphs, we look at how to turn the default 'business style' graph into a more scientifically acceptable plot. Other graph plotting software is introduced, together with introducing student to the skills of line fitting and inserting error bars

### **Session 7: Adding trend-lines and error-bars to graphs**

Participants engage in a range of activities using databases to support student learning in analytical techniques (interpreting IR, NMR and mass spectra), access the Genome database, and access a stellar database that can be used to support all the calculations required for teaching astrophysics.

### **Session 8: Optional Sessions**

Participants have a choice of activities:

- How to assess ICT-based activities
- Learning to use Wolfram Mathematica to enhance the documentation of calculations, visualize graphical relationships and create and utilize computer simulations.
- Learning to use ACD/ChemSketch, a molecular structure drawing tool
- Learning how to introduce molecular visualization to students with stimulating activities in protein visualization and measurement.
- Learning to use LabView for use with laboratory-based data acquisition and data analysis

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### **Workshop leader biography**



Keith Wilkinson has been teaching Chemistry since 1994 in the UK, and IB Diploma Chemistry and Theory of Knowledge since 2000 at an International School in Zambia. He is an IB Examiner and author of the IBO's teacher support materials 'Using ICT to enhance student learning in Chemistry'.

BSc(Chemical Engineering), MSc(Medicinal Chemistry and Medical Imaging), MAEd(Educational Leadership), PGCE(Science).