Relating theory to practice using interactive whiteboards:

An Engineering Case Study

What was the learning and teaching challenge that this initiative sought to address?

Undergraduates in our Department need to understand key (complex) concepts faced during experiments in order to progress in other core modules, and also for their professional lives after graduation: concepts such as vapour-liquid equilibria and psychrometry. The depth of learning in lab sessions is difficult to gauge, although the students are expected to engage and understand what they are doing.

We wished to develop interactive software to be used in situ in the lab, which would relate the theory fundamentals to the practical application in a visual context. The interaction would also allow the students to have feedback on their level of understanding, and therefore promote student-centred learning. The students would come to the lab, undergo training and evaluation using the visual system, and then move on to the actual lab exercise. The project would establish a novel learning interface for undergraduate students which would enhance interaction with difficult concepts faced during experiments.

What did you do and what were the outcomes?

We installed two separate Interactive Whiteboards (IWBs) in different laboratory-based scenarios:

1. Portable IWB

An interactive plasma screen was purchased and interactive software was developed from existing teaching materials used for the distillation topic for second year chemical engineering students. This software was adapted for use with the interactive plasma screen by allowing greater functionality from a finger-touch on the screen, using large on-screen operated 'buttons'.

A training session was held for postgraduate demonstrators to highlight the software and its relevance to the individual laboratory experiments.

Early indications suggest that the use of the portable IWB in the laboratories leads to an improvement in learning. The laboratory report scores of the students using the IWBs were compared with those in the previous cohort who carried out identical distillation experiments but did not use the IWB. Results increased from a combined average of 6.42/10 before the use of the IWB to a combined average of 7.65/10, using the same marking scheme.

2. Static IWB

An Activboard +2 was installed and has been successfully interfaced with laboratory hardware. The Interactive Whiteboard (IWB) projects a full-screen systematic image of a real-time chemical process which is located a few metres away. The equipment can be operated using a series of inputs directly from the IWB itself, and the response of the experiment is shown in graphical form on the IWB. Developments to the software and interface are currently being explored which will further enhance the interactive nature of the process.

The IWB-driven laboratory equipment is thought to be a first for chemical engineering education in the UK, and is already being used as a 'flagship' demonstration experiment for Open Days and interview days for prospective students.

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Dr John Robinson

Dr John Robinson is interested in the use of visual learning and novel forms of assessment within Chemical Engineering, and has research interests including novel separation and processing techniques using microwave technologies, and membrane separations with advanced materials.