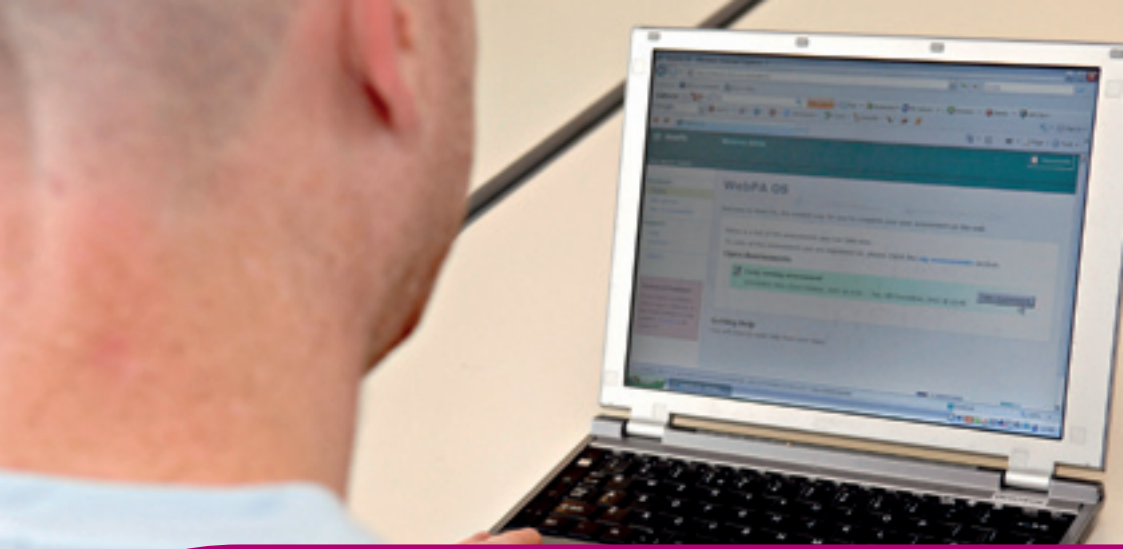

WebPA: a Web-based Peer Assessment System

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Introduction

The focus of this case study is on the development of a web-based peer assessment system, now known as WebPA, through a long process of collaboration between engCETL and its forerunners the Engineering Teaching and Learning Support Centre (EngTLSC) and the Engineering Education Centre (EEC), and academic staff at Loughborough, especially with Dr Peter Willmot of the Wolfson School of Mechanical and Manufacturing Engineering and Dr Keith Pond of the Business School. The history of this project is not only a reflection of the on-going support provided by the Centre for academics seeking to make effective use of e-learning tools in an attempt to tackle pedagogic problems, but also of the way in which together they have responded positively to the opportunities provided by advances in online technology and the growing sophistication of its applications.

Context

There has been a long-standing commitment to the use of group project work in engineering and other departments at Loughborough University. Higher Education policy makers, QAA Benchmarkers, professional bodies responsible for the accreditation of degree programmes and employers, have all encouraged the use of such methods – seeing them as an effective means of furthering the acquisition of subject knowledge as well as developing 'core', 'employability', 'generic', 'key' and 'transferable' skills (Yorke, 2004). In general, Dr Willmot found that while his Mechanical Engineering students responded positively to the learning experiences offered by this approach, they occasionally voiced some concerns about the methods used to assess the contributions individuals had made to what had been achieved by their groups – according to a survey by Blease (2006), their reservations about assessment were shared by other students at Loughborough.

Problems

The crux of the problem was that, whilst it was a relatively straightforward matter to assess the tangible outcomes of students' group work, it was much more difficult to assess the group's work itself – particularly the relative contributions made by individual students. The products of group work such as presentations, project reports, poster exhibitions and artefacts could all be assessed using methods similar to those used in the assessment of the work submitted by individual students – and in so doing conform to such important principles of assessment as 'validity', 'reliability' and 'transparency'. The difficult part, as Dr Willmot discovered, was finding ways of assessing the group processes leading to the production of measurable project outcomes, particularly the contributions made by individuals to the collective endeavour. Like many others, he concluded that the only people who could really undertake that task were those who had been integral to the process in its entirety i.e. the group members themselves.

Having reached that conclusion, Dr Willmot set about devising a system of self and peer assessment by which individual students could assign marks/grades to those participating in the work of their group. In the early stages this was a paper-based system in which each team member was asked to rate everyone in their team (including themselves) against a number of assessment criteria. This left him with the considerable task of collating marks and calculating mean scores/grades for each member of the group – a time consuming process which had to be repeated across all the groups. During this early stage he experimented with the assessment criteria and the scoring system – refining and modifying them in the light of feedback. Whilst he and the students considered the system he had devised for the assessment of their group project work to be an improvement on previous practice, it was nevertheless extremely time consuming to implement – even with the use of an Excel spreadsheet to process raw data.

It was this situation that prompted him to seek the assistance in 1998 of the then engTLSC by submitting a proposal for a project to develop an automated system of peer assessment based on the paper system he had been using since the early 1990's. This initiated an on-going process of development activity on web-based peer assessment by the Centre, performed in collaboration with academics and their departments at Loughborough, and culminating in 2006 in the award of external funding by the Joint Information Systems Committee (JISC) for a project to develop an open source version of the software.

Project aims

The main aim of the initial project was to develop an online peer assessment tool, that would provide a flexible method for peer moderated marking of students' group project work, which both staff and students would find easy to use. It was anticipated that such a tool would have an interface that would allow the academic staff using the system to allocate the students on a particular module to working groups, input assessment criteria, and set the dates when the grading form would be available to the students. The system would be so designed that students would then be able to assign grades to the individuals in their groups – each student being asked to rate everyone in their learning set (including themselves) against pre-determined criteria, and to submit the completed form online. These core aims have continued to underpin the development work, which has been undertaken in successive stages in the life history of this project.

Key dates

1998 Paper-based system developed by Dr Peter Willmot in Mechanical Engineering
1999 **P**eer **AS**sessment **S**ystem (PASS) developed in collaboration with PW and Dr Andrew Nurse
2002 Re-write of PASS to became WebPA
2002 WebPA made open to all users at Loughborough University
2006 WebPA Project (funded by JISC)
2007 Open source version of WebPA developed in collaboration with other HE partners

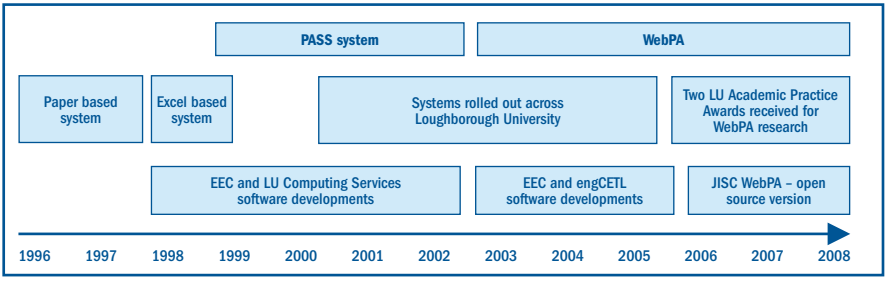

Diagram of WebPA timeline

Project actions

The collaboration between the education technology and education development staff at the Centre (by now the EEC) and Dr Willmot resulted in the development of PASS. Although this achieved the project aim of providing staff and students with a usable tool, the system at this stage did not contain as much automation as the technology would allow, and as a consequence, still imposed significant demands on the academic staff using it in terms of the time required to set up and manage each assessment.

The PASS system was redesigned and further developed to address these issues, becoming WebPA. As before, the software application enables the tutor to allocate students to their groups and define the assessment criteria that the students should apply. Each student confidentially allocates marks to all members of their groups (including themselves); the tool then automatically collates the students' marks and calculates a final mark for each via a group-specific weighting factor (determined by the tutor).

In 2006 the CETL was awarded project funding by JISC (on the strength of the work it had undertaken with its partners at Loughborough) to collaborate with other HE partners to develop an open source version of WebPA.

The collaborative activities undertaken by the CETL in this project have gone beyond simply developing a web-based peer assessment system; they have been part of a wider strategy for supporting institutional policies, raising the status of teaching and learning, and supporting academics and their departments in their attempts to enhance the learning experiences of their students. Therefore, much activity has been directed at promoting professional development, including running workshops showcasing WebPA and including information about it and other engCETL tools in the induction packs that are distributed to new lecturers. The tool has also been actively disseminated at Loughborough by means of the engCETL events and its website, and to other HEIs by means of the workshops run by the Higher Education Academy Engineering Subject Centre (EngSC) and its newsletters and website – dissemination and active promotion being seen as of crucial importance in the transfer of innovative practice (Beadle 2003).

Project outcomes and impact

There have been many notable outcomes from the on-going work of this project, not least the creation of a robust, user-friendly and heavily employed web-based tool that can be deployed by academic staff and used by students in order to deliver self and peer assessment of group project work – the resultant assessments being judged by users of WebPA to be fair, reliable and valid. The system has also been shown to save considerable amounts of time and effort on the part of hard-pressed academic staff in the setting up and running of each peer assessment – time that they can now devote to other activities.

For their part, students have responded positively to their experience of using WebPA. One engineering academic reported that *"students generally like the tool and there has been a massive reduction in the number of complaints voiced about their design project grades"*; a student said of his experience of using the peer assessment system that *"this fair method allowed us to identify each others' strengths and weaknesses"* adding that *"we worked better in subsequent group activities"*. The second point made by this student highlights the contribution that the use of WebPA can make to teaching and learning, not just to improving the assessment of group project work, but also to enhancing the students' experiences e.g. by giving them opportunities to develop their 'employability skills'. One student expressed this as follows: *"... giving students the opportunity to develop constructive self and peer criticism skills is very important. In the case of engineering for example, the use of peer and self-assessment skills in real-life industry is crucial, and students should be very familiar with them before they graduate"*. Given the positive response of students to their experiences of using the system it is little wonder that a member of the CETL staff involved in the project reported that *"some academics have been almost 'nagged' into using WebPA by students who had used it previously on other modules"*.

Whilst developed initially through close collaboration with academic staff and students in engineering and then with those in Business Studies, the WebPA system itself is generic – the problem of attributing grades to individual students working on group projects being applicable to any number of subject disciplines. This is borne out by the wide range of departments at Loughborough University in which the academic

staff are now using WebPA to assess their students' group project work, which in turn is reflected in the increased number of staff and students using WebPA (illustrated in the table below).

Academic Year	Number of Academic Staff Users	Number of Student Users
2005-06	41	757
2006-07	43	2676
2007-08	55	2924

The provision of project funding by JISC enabled the CETL to employ two staff to work on the development of open source versions of the WebPA software, evaluate its use, and in so doing, to raise its national profile through collaboration with a number of partner HEIs. International recognition has also been forthcoming through the receipt of an IMS Global Consortium Learning Impact Award.

The experience of working on the development of WebPA has created continuing professional development opportunities for engCETL's staff and for the academics that have collaborated with them. This is reflected in the large number of contributions they have made to prestigious conferences and INSET (In Service Trainging) events staged at Loughborough, elsewhere in the UK and even internationally. Their contributions to scholarly activity and pedagogic research in relation to the development and use of web-based tools for the self and peer assessment of group project work is also manifest in the publications of numerous articles (see e.g. Pond, et al 2007; Willmot and Crawford, 2004, 2005 and 2007 and Willmot et al, 2008). Dr Willmot, whose project proposal in 2002 initiated the development work that led to WebPA, has been the recipient of two awards in recognition of his contribution to teaching and learning – a University Teaching Prize in 2004 and a University Academic Practice Award in 2006; Dr Pond also won a separate Academic Practice Award in 2006.

Finally, the educational technologists working on the development of WebPA report that they have been able to adapt a lot of its underlying code into a set of shared libraries (e.g. 'Authenticating users' and 'Access to student records'), which they will be able to draw upon in current and future engCETL projects aimed at developing web-based tools for use in enhancing pedagogic practice.

Discussion

This engCETL project has addressed some practical problems that highlight two closely related pedagogic issues: assessing students' group project work and enhancing the students' learning experiences. As evidence by Blease (2006) *"WebPA appears to be the most transparent, well-documented and effective way to manage self and peer assessment, especially when dealing with large cohorts of students."*

With regard to the former, the approaches to self and peer assessment that have been integrated into WebPA are not only practical and straightforward for staff and students to implement, but are also theoretically sound in terms of the principles of assessment to which they adhere, notably their 'validity' (i.e. they measure what they set out to measure), 'reliability' (i.e. they are fair and consistent) and 'transparency' (i.e. they are open and clearly defined). When deployed in association with the WebPA software, they also have the effect of drawing students into the centre of the assessment system so that they become active participants in the process. It has been claimed that this shift in the students' role in relation to assessment has a beneficial effect on their learning; one writer (Race, 2001) asserts that students taking part in *"curriculum elements where [they] have been involved in self and/or peer assessment are found, through formal assessments such as exams, to have learned much more deeply"*.

Enhanced student learning of this kind may well be related to the fact that self and peer assessment, as used in WebPA, provides students with a framework within which they are able to review and reflect on their personal experiences of working in groups. In other words, using the assessment criteria (provided by their tutor) to tease out what it is that each individual member of their group (including themselves) has contributed to what has been achieved, and then attributing marks/grades to those judgments, is an integral part of the whole learning process. It has the effect of helping students to bring to consciousness aspects of their learning experiences and to make connections which might otherwise have remained hidden or tacit. In so doing, this helps students to consolidate and deepen their knowledge and understanding of what they have learned from the experience of working with others in a group (Kolb, 1984; Brockbank and McGill, 1999; Moon, 2004).

The people involved in the development of WebPA view group project work as a teaching and learning method that not only furthers students' acquisition of subject-specific knowledge, but also develops skills relevant to future employment and lifelong learning (e.g. communication, problem solving, working with others, improving own learning and performance). This is because working in a group provides a rich environment for student learning – one in which its members have an opportunity to manage and direct their own learning, and to practise and develop their skills in listening, explaining, negotiating and working with others. By functioning in this way, students become 'co-learners' i.e. through the social interactions within their groups they are able to extend and deepen their knowledge and understanding of the subject matter under consideration. Race (2001) expresses this as follows: *"when someone has just seen the light dawn on a tricky concept for example, explains it to a fellow student, the explanation tends to be more effective than when someone who has known it for years tries to explain it. The act of explaining has a high learning payoff"*. It should be noted that according to social constructivist theories of learning (e.g. Vigotsky, 1973) that the *"payoff"* in terms of student learning resulting from *"the act of explaining"* is beneficial for both the individual giving the explanation and for those doing the listening – the shared discourse being a means of achieving enhanced knowledge and understanding for all of the participants.

The literature also suggests that students can be considerably enthused by the learning opportunities offered by group project work and by participating in the related self and peer assessment. Indeed it has been argued by some that group work of this kind has the capacity to motivate students to such an extent that it is capable of transforming their whole attitude to their work, and of engendering a belief that they can succeed through their own efforts and actions – as opposed to being dependent on direct instruction and guidance from their lecturers. In other words, they see group work as a powerful means of encouraging and reinforcing in students what has been called *"effort-based learning"* (Dweck, 1999; Resnick, 2000) – a view which is consistent with recent research into the motivation of learners in a variety of educational contexts (Smith and Spurling, 2001).

Conclusions

This development project has succeeded in delivering a robust and usable web-based tool, which has addressed the practical problems facing staff and students related to the self and peer assessment of group project work. The approaches to assessment, which have underpinned the development and application of WebPA, are consistent with the accepted principles of good practice with regard to assessment, and by supporting the use of group project work in this way, help to enhance the students' learning experiences. Therefore it is not surprising that the tool is widely used – not just across subject departments at Loughborough but in a wide range of other HE sector institutions in the UK and beyond.

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