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Postgraduate Student Perspectives of Using an On-line Learning Environment

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1. Introduction

In conjunction with the development of two new postgraduate programmes at the University of Sunderland a new on-line learning environment was created. Course material was developed and used by students as the primary means of learning. As this was the first experience of using such an environment a survey was conducted to determine what students thought of the learning experience compared to that they received on the other programme modules. The results of which will be used to improve future versions of the environment.

The following sections describe the need for on-line learning environments and describe the environment developed at Sunderland. The survey method is described, explaining how and why the data has been presented. The results of the survey are described and a critical evaluation of this data is presented. Finally, conclusions and future work are given.

2. Learning Environments

2.1 Online Learning Environments

The future impact and developments of electronic learning environments has been predicted for some time [1] and more recent predictions suggest that "E-learning will account for almost half the projected $16.9 billion business skills training market by 2004 ..." [2]. Modern online learning environments employ the latest facilities of the world-wide-web [3] and are now a current effective way for learners to develop their educational goals. There are number of existing learning environments available, including TopClass [4], Virtual-u [5] and WebCT [6]. Information on the comparisons of existing on-line learning environments is available [7] [8]. While all of the learning environments have a valid claim to provide a suitable environment for learning, none of them are perfect. It was for this reason that the School of Computing and Technology at the University of Sunderland decided to design and develop its own environment to enable it to specifically customise the environment to try new tools and ideas in order to contribute to this area of research.

2.2 The Sunderland Online Learning Environment

The Sunderland Online Learning Environment (SOLE) was initially developed at the School of Computing and Technology at the University of Sunderland in late 2001. Since it went live in January 2002 the system has been refined and improved and is current on release version 2. Developed using PHP [9] and MySQL [10] technology the environment was designed to trail the use of the World Wide Web as a vehicle for quality independent learning and teaching. The SOLE environment provides students with an integrated set of tools and facilities to aid the learning and teaching experience. These include, email, a reflective diary, chat rooms, discussion forums, self-assessment questions, activities and model solutions. These are all based around the main tutorial materials. SOLE has a comprehensive administration system, and differs from other environments in that the whole systems, including the tutorials are stored in a database and the environment is generated dynamically during run-time.

Students were encouraged to use the environment as part of a tutor supported tutorial each week, in addition to accessing the materials independently at any time. SOLE was designed for use either way. While, initially most students attended the tutorials as well as accessing at other times, towards the end of the module a large number of students were accessing materials at various times and from both inside and outside the University and not during the scheduled tutorials.

2.3 Programmes and Modules

The MSc Electronic Commerce and the MSc Electronic Commerce Applications are two postgraduate programmes specifically designed for computing and non-computing graduates respectively. These programmes each have a module focusing on the area of Tools and Technologies for E-Commerce. While there are differences between the two modules, they do share a common core, which teaches students how to design and build E-Commerce systems using the PHP and MySQL technologies. It was determined that the common aspects of these modules would form the basis of the first on-line module supported using SOLE. It was also deemed appropriate that the initial on-line module would teach the technologies that were used to create the SOLE environment itself.

3. The Survey Method

3.1 Questionnaire Design and Population

Students on these two postgraduate programmes began using SOLE in early January 2002. Towards the end of the module in April a survey was created to collect feedback on students experiences of using the environment. The survey consisted of 15 questions, the majority of which were of a closed form. The questions asked students to provide a graded response between 1 and 5, where 1 was very negative and 5 very positive.

The combined total number of students on the modules is 86 (split evenly between the two programmes) and of these 58 students returned questionnaires, a total of a little over 67%. Interestingly, use of SOLE was not restricted to the students on these two programmes alone. In fact anyone who was aware of the system could register freely and have access to the system. Today there are 137 people registered using the SOLE environment and the number is growing daily. Analysis of usage statistics suggests that more than 100 students access the environment on a regular basis.

3.2 The Survey Respondents

The two MSc Electronic Commerce programmes attract students from around the world and are proving to be very popular. Figure 1 illustrates the percentage of different nationalities that responded to the survey.

It was decided that as the survey population consisted of students with a computing background and those without one, it would be interesting to analyse the data collected to see if there were any difference in opinion and experience between these two groups. Furthermore, the population also consisted of male and female students. It was also thought to be interesting to analyse the data to see if there was any differences in opinion between the two sexes. Therefore, the data in the remainder of this paper is presented for each of these four categories, males with computing experience, males without, females with computing experience and females without.

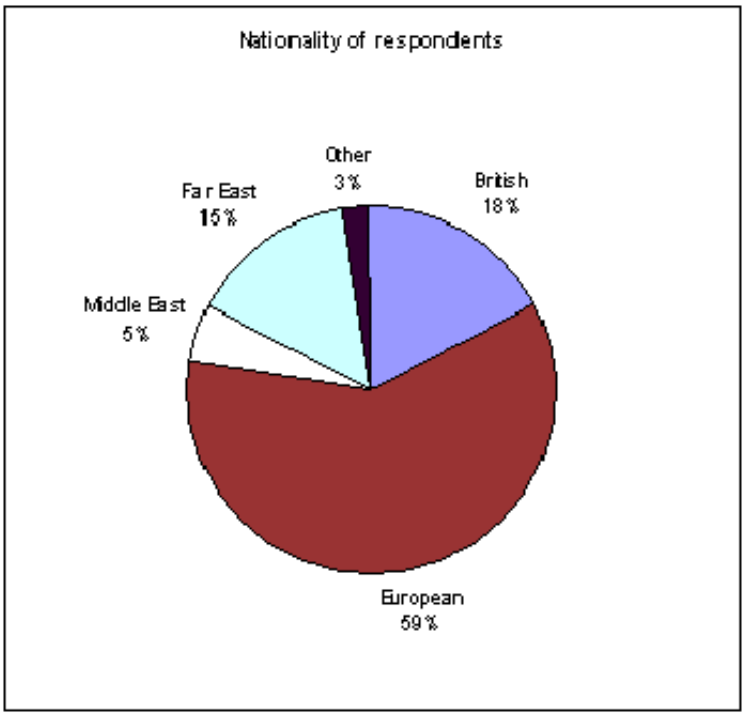

Figure 1 - Nationality of Respondents.

Unfortunately, while the balance between computing and non-computing students is equal the balance between male and female students is not. Both programmes are dominated by males, as can be seen in Figure 2. Of the 58 respondents only 12 were female, as there are only 20 female students on the programmes this equates to similar percentage of the male population who returned questionnaires (60% compared to 54%). Of course as there is statistically a small number of female respondents, drawing any gender specific conclusions would be statistically dangerous. However, where the data does suggest any interesting differences these are highlighted

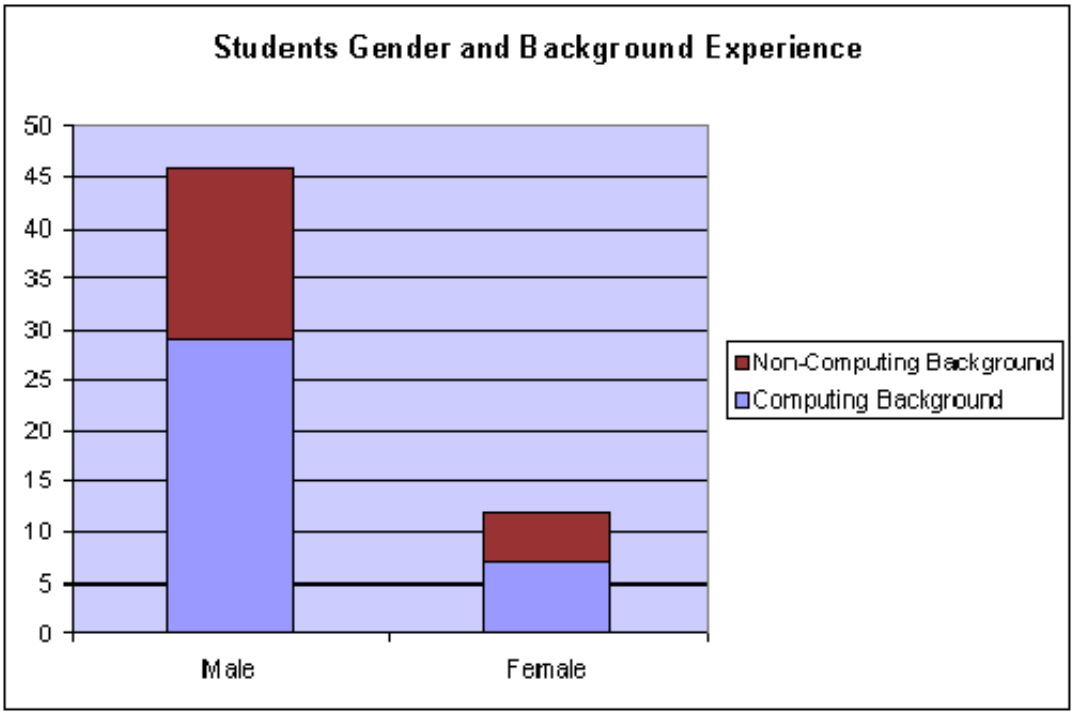

Figure 2 - Student Gender and background computer experience

4. Survey Results

4.1 Perceived Enjoyment of the learning experience

Students were asked whether they found using SOLE an enjoyable experience. They were asked to grade their responses from defiantly not (the worst case) to very much (the best). The results obtained from this question are illustrated in Figure 3. Although asking students whether they found the system enjoyable may be considered controversial, since what exactly is "enjoyable", it was deemed valid in terms of gauging student general learning experience of the environment.

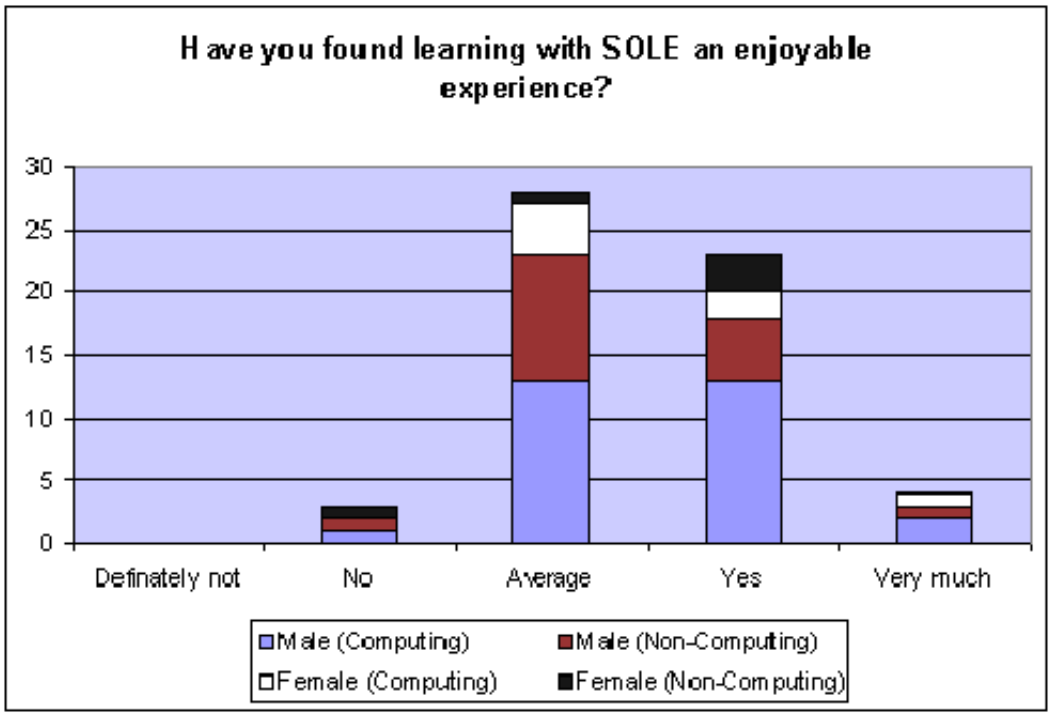

Figure 3 - Students Learning Experience

The data shows that no students ranked their experience as definitely not enjoyable, although 3 (5%) students stated that they did not enjoy using the environment. 46.5% of students did rate their experiences are being enjoyable or very enjoyable. 48% of students indicted that their experience was average, no better or no worse that other experiences on their programmes. Analysis of the data confirmed that in both male and female cases students with a non-computing background scored their enjoyment of the environment less than those of students with a computing background. We suspect this is a result of students who feel more confident with the technology have time to explore and use the environment more effectively than those students who are struggling with technical subject matter for the first time. Another possible reason why students with non-computing backgrounds, scored their enjoyment less may have nothing to do with using the environment, but their overall perception of what the module represents. Programming in PHP would represents a considerable challenge for those who do not come from a computing background and this may be the reason why they are not enjoying it as much as the other students.

4.2 Comparing SOLE against other forms of learning

Students were asked to rate their opinion of using SOLE against the other traditional forms of learning and teaching employed on the other programme modules. While the students were not considered to be experts in this area we thought that they would have an opinion on what suited them. The results obtained are illustrated in Figure 4. The results are very positive. No student rated the environment as being very poor compared to other forms of learning and teaching and only 1 rated it as being poor (although no

reason was given in the open feedback part of the questionnaire). 4 (7%) students rated the environment as being excellent and a total of 53% either rated the environment as good or excellent. The remaining 45% graded SOLE as providing no real differences in the teaching and learning experience when all things were considered. When examining the gender and background statistics it was noted that both groups of male students and computing female students on averaged rated SOLE at approximately the same score. However, computing female students rated the environment a little higher. We have no explanation for this and given the small number of female student respondents this could be a statistical anomaly. It is interesting to note that both groups of male students voted evenly between the 'average' and 'good' scores.

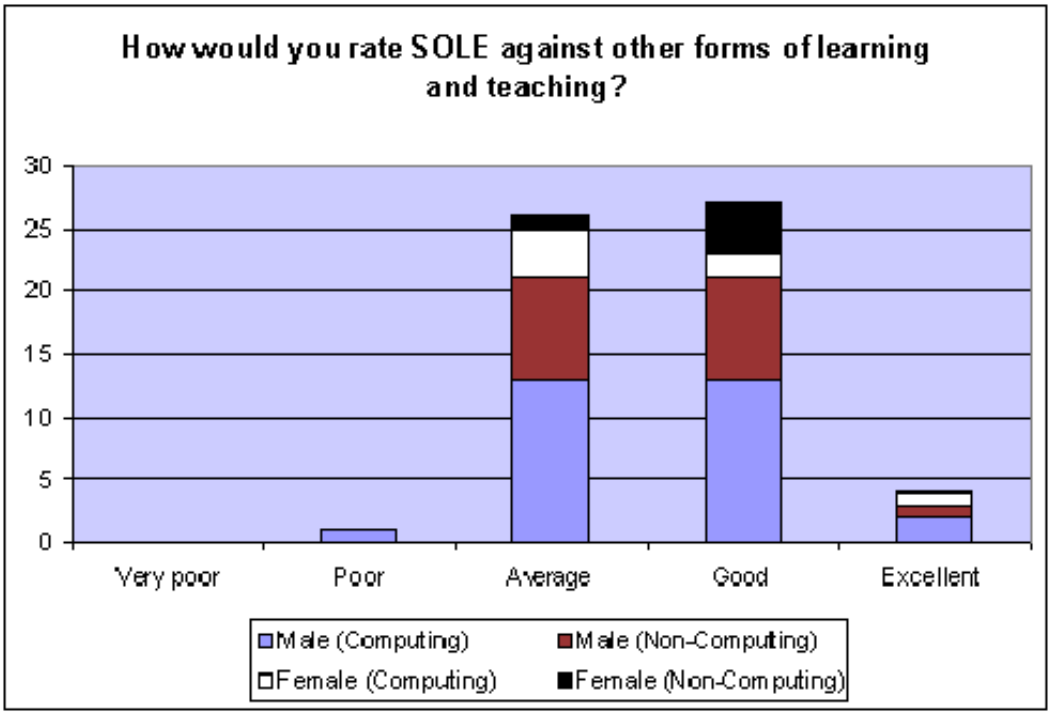

Figure 4 - SOLE compared to other forms of learning and teaching.

In terms of the teaching and tutorial materials made available through SOLE, they are at a level that teaches the fundamentals of both PHP and MySQL. While the SOLE system handles this quite well, there is a question as to whether the system is able to teach some of the more basic principals that go behind software engineering and systems design. In the case of PHP, programming is not just a case of coding something and hoping that it does what it's supposed to do. For a given problem, this must be carefully analysed step by step in order to derive the exact requirements that will help resolve the problems at hand. While this may be natural to someone who already has computing or technical experience, it will take much more effort for people with limited technical experience to get into the mindset of a programmer. This problem is also apparent in the case of the MySQL database development environment. Database systems development is a comprehensive task and one that requires a set of skills and knowledge in order to accomplish properly. In an undergraduate degree, both software engineering and database systems design are taught modules in themselves. The SOLE system currently doesn't teach any of these explicitly, so there is an assumption that students using the system are at least competent in programming and systems development.

4.3 Changing Opinion of SOLE

We were particularly interested to know whether student opinions of the environment changed during their time using it and if so did they change for the better or worse. The results from asking this question are illustrated in Figure 5. Only 4 students (7%) indicated that their opinion of the environment got worse during their time using it. 43%

of students felt that their opinion of the environment neither improved or worsened. However, a total of 50% of students felt that their opinions of the environment improved or substantially improved the more they used it. We did predict that if the students found that they were able to learn using the environment once they had overcome their fears and adjusted to a different form of learning that their opinions would improve. When examining the background / gender groups it was noted that just like the previous question female non-computing students felt more strongly than the other groups that in their opinion they liked the environment the more they used it. Again this was predicted as we thought that the opinions of the environment for people not from a computing background would certainly improve for the better after becoming more settled using the technology. This however was not borne out with the male non-computing students, as they were on average the least positive with their opinion of the environment improving with time.

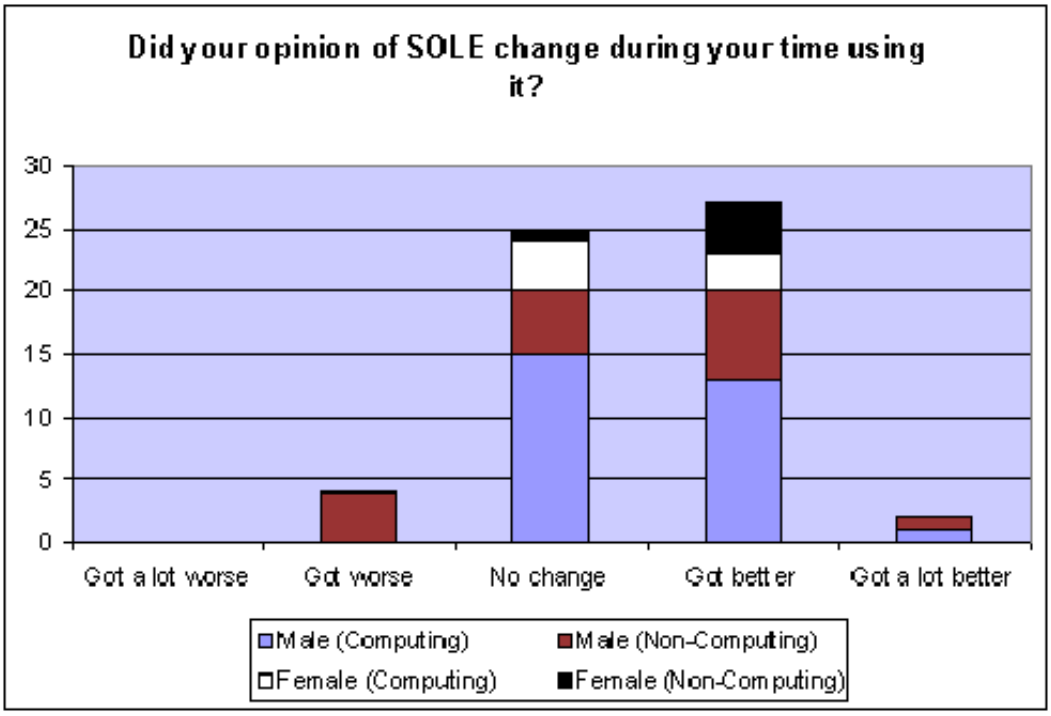

Figure 5 - Opinion of SOLE during time using it

4.4 Confidence in using the environment without tutor support

We were concerned that students would not like using the environment when there was no tutor support. As mentioned earlier we designed our teaching plan so that students would receive a two-hour tutor supported tutorial each week. Students were encouraged to use the environment at anytime however. Figure 6 illustrates the results of asking the students if they felt confident in using the environment without any tutor support. It is important to remember that the support tools such as the discussion groups, email and chat are always active. Analysis of the data reveals that no student felt very unhappy about using the environment without tutor support and only 15.5% felt unhappy about doing this. 34.5% of students were unconcerned about it and indicated that they felt there was no difference in using the environment whether there was a tutor available or not. Interestingly, the number of students who said they were happy to use the environment without support and those that were very confident to do so was a large 50%. We were particular happy with this statistic as we were worried that a much larger number of students would have indicated they would much prefer to have direct face to face contact with the teaching staff. However, such a large response raises an issue in the interpretation of the question. It is likely that many of the respondents interpreted this question quite literally. In terms of using the system itself, then yes the system is quite self-sufficient and there may be less of a need for tutor support. The authors believe that

the proper interpretation of the question was to ascertain whether students felt confident that they could go away and use the system while learning about a particular aspect of PHP and MySQL development on their own. Perhaps a more appropriate question would be 'How much more confidant am I in learning a particular aspect of PHP and MySQL development on my own, without tutor support'? It is highly probable that the responses gathered from this question would yield very different results. Bradbury and Farrell [11] note that the absence of face to face contact between students and lecturers can be a great demotivator. Student comments on this explained that they particularly like the freedom of being able to access the materials whenever they liked from anywhere, but they appreciated the safety net of a scheduled tutorial, which they could attend if they felt the need.

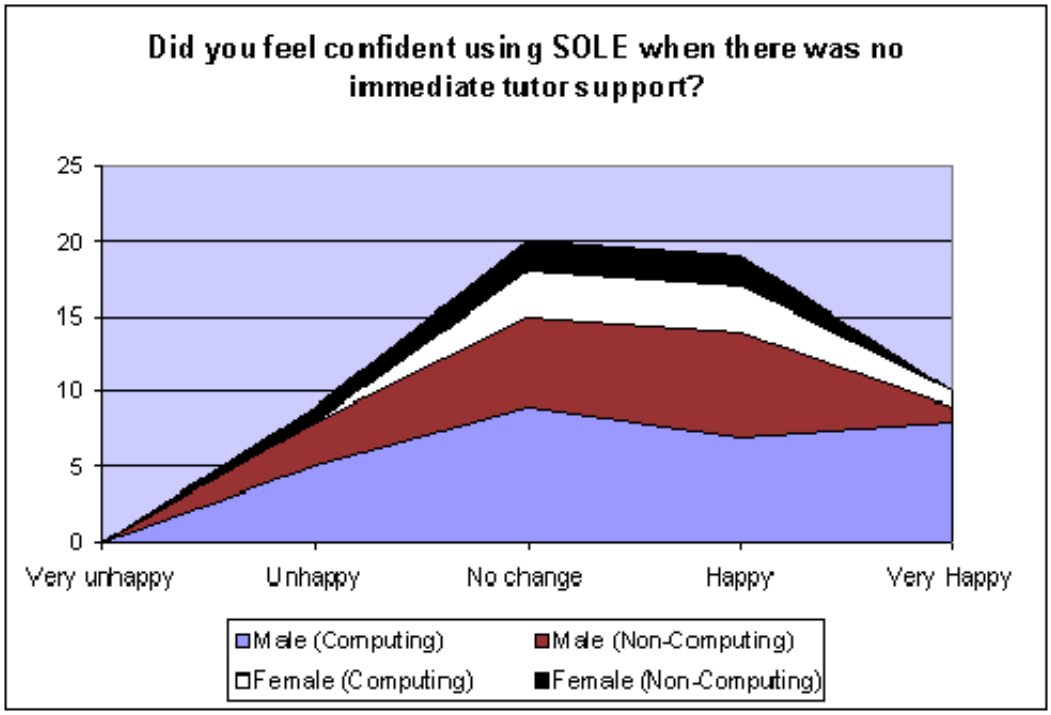

Figure 6 - Confidence of using SOLE without Tutor Support.

6. Summary and Further Work

This paper has presented the results of a survey undertaken to gage opinion of SOLE developed and used at the University of Sunderland. The results obtained were in general very positive and while we were not able to quantify these results the positive effect the environment seems to have had with majority of students is quite evident. Part of the success of the system will be determined on how well students perform when they eventually build their e-commerce applications as part of the module assessment. This is will give a more clearer view on how well the system teaches the fundamentals of PHP and MySQL. A number of useful suggestions for improvements have been received. These combined with ideas already in the pipeline will see a new generation of the environment developed in mid-2002, ready for use with the next cohort of students. Features being considered include a far more customisable interface, the ability for students to personalise their tutorial materials leaving both private and public comments for themselves and others. In addition the ability to submit and run their own code examples within the environment, an automated scheduling tool for tutorials within a particular cohort is already underway. The latest version of SOLE is available at http://scettech.sund.ac.uk/sole2/

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