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Traditional learning versus technology based learning (TBL) – an evaluation of the effectiveness of the Wolverhampton Online Learning Framework (WOLF)

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Background and rationale

Introductory Microbiology (AB1101) is a Level 1 Semester 1 module accessed by most students studying Biosciences degree and HND programmes within the School of Applied Sciences, together with students on Combined Awards and Exchange programmes across the University and students accessing the University through franchised colleges. The varied student cohorts have broad background qualifications, such as A levels, GNVQs, access courses and mature students without traditional qualifications.

As with other institutions of higher education[1], over a number of years the module team (under the direction of Dr D. W. Sunderland) have been developing web-based material to support and supplement teaching on the module. The introduction of WOLF as the University Technology Supported Learning platform provided a system to enable accessibility and the web based material was subsequently transformed into WOLF.

In recent years the module has been delivered by a traditional mix of lectures tutorials and practical sessions during Semester 1, consisting of 12 lectures, 6 tutorials and 6 practical sessions. Student performance on the module has been assessed by three multiple choice tests staged during and at the end of the module.

WOLF usage represents a shift away from the accepted teaching norm, typical within the Biosciences Division, which was considered to be "excellent" for Teaching and Learning by the Quality Assurance Agency. Recently, WOLF has been actively promoted by the module team to support and supplement teaching on Introductory Microbiology, although not as an alternative mode of delivery. With the development of the WOLF material for this module, the opportunity existed to replace lectures to achieve efficiency gains.

The University strategy to ensure that by 2005 '25% of current face-to-face learning engagement in each subject will be equally available through technology', combined with a divisional initiative to increase efficiency, led to the adoption of a strategy to integrate and WOLF material into module delivery.

The effectiveness of such an approach was, however, uncertain and is indeed the subject of national debate[2]. A thorough evaluation was, therefore, considered appropriate to determine the pedagogical reliability of the delivery system as an alternative delivery mode. In addition, authorities including the Quality Assurance Agency, require rigorous reassurance of the reliability of such systems[3].

The research

Specifically, two aspects were investigated:

- relative test performance in relation to mode of syllabus delivery (lectures and tutorials versus WOLF)
- the students' perspective of TBL

A methodological approach similar to those published by others[4,5], was used to determine the effectiveness of lecture replacement. Prior to the start of the module, four lecture sessions were identified which were able to be replaced by WOLF material. Ample opportunity was made available for student access and engagement with the system. Lecturing slots were vacated and students were also encouraged to use independent study time within the overall module study time, to access WOLF. During the study, the module was assessed in the theory component by performance on three multiple choice tests staged throughout the module. The effectiveness of WOLF would be by a comparison of performance on these tests in relation to questions derived from lectures and WOLF. A total of 106 students attempted the module during the project.

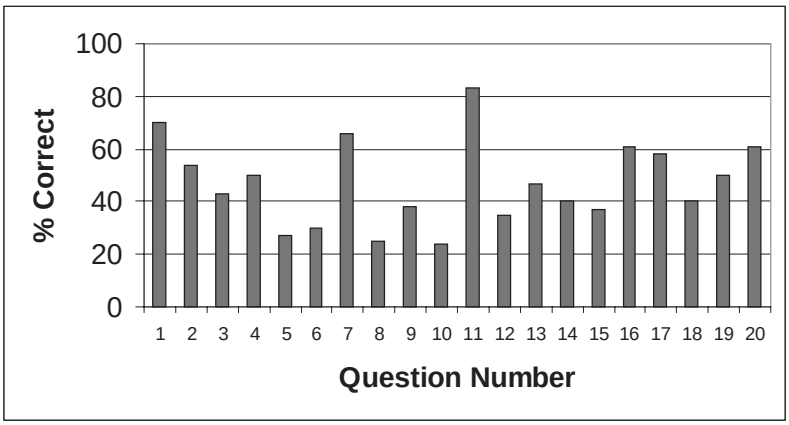
The student perception of the strategy of lecture replacement was established by the use of questionnaires. Two questionnaires were distributed to the students towards the beginning and end of the module.

The outcomes

Test Performance

Figure 1 represents the percentage of students selecting the correct option for each question for test 1.

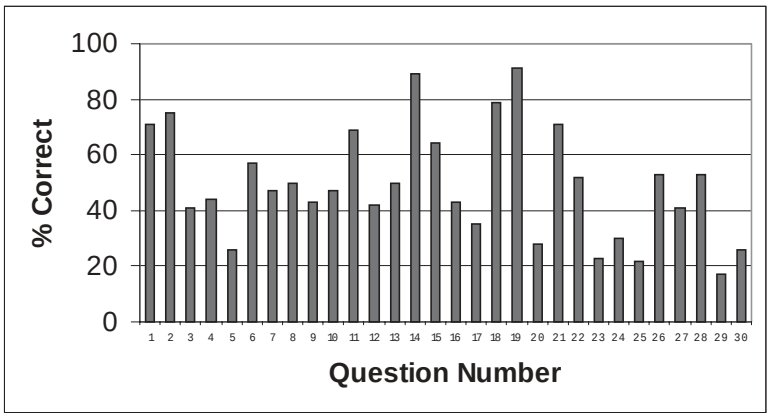
Figure 1: Percentage of correct responses per question for test 1 (n=101).



Evaluation of responses from questions derived from lectures and those from WOLF indicate that for questions derived from lecture material, 47.4% of questions were answered correctly. For questions derived from WOLF material (questions 9-12), 44.9% were answered correctly.

Figure 2 represents the percentage of students selecting the correct option for each question for test 2.

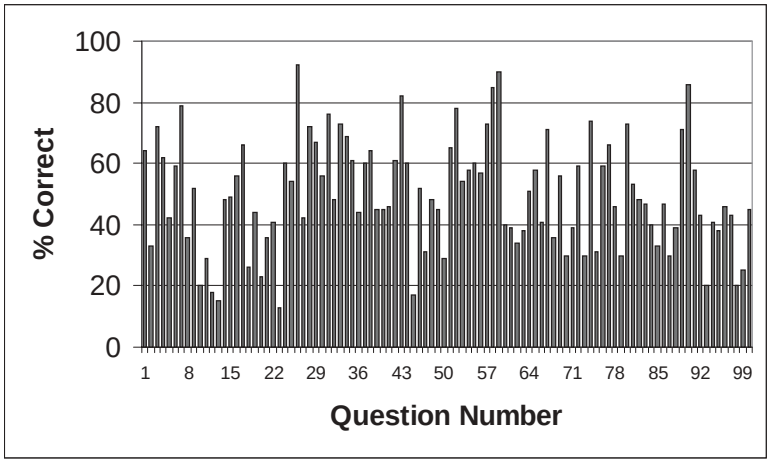
Figure 2: Percentage of correct responses per question for test 2 (n=105).



Evaluation of responses from questions derived from lectures and those from WOLF indicate that for questions derived from lecture material, 49.6% of questions were answered correctly. For questions derived from WOLF material (questions 7-10 and 20-22), 48.1% were answered correctly.

Figure 3 represents the percentage of students selecting the correct option for each question for test 3.

Figure 3: Percentage of correct responses per question for test 3 (n=99).



Evaluation of responses from questions derived from lectures and those from WOLF indicate that for questions derived from lecture material, 50.0% of questions were answered correctly. For questions derived from WOLF material (questions 41-44, 62-67 and 82-87), 48.6% were answered correctly.

Questionnaire responses

Two questionnaires were made available to students on the module at the start (late October 2002) and toward the end (early January 2003). For each student a questionnaire was made available and was to be completed anonymously. The principal intention of the questionnaires were to gauge the students' perception of the delivery approach and to determine whether there was student resistance or enthusiasm to the use of the WOLF system for delivery. In addition, the questionnaire contained questions on the award being studied, access to University computing facilities, internet access outside the University and space for further comments. The principal outcomes are detailed in Tables 1 and 2.

Table 1: Student responses from the October questionnaire.

		Yes	No
1	Before the module began, did you expect to have electronic sources of information (WOLF) made available on this module?	28.26	71.74
2	When informed of the availability of WOLF material at the beginning of the module, did you expect this to be of potential benefit?	91.30	8.70
3	Have you registered on WOLF?	91.30	8.70
4	To date, do you believe that you benefited from WOLF usage in relation to understanding microbiology better?	80.43	19.57
5	Do you believe that you benefited from WOLF usage in relation to test performance on this module?	63.04	36.96
6	Do you consider the replacement of lectures with WOLF material to benefit study?	60.87	39.13
7	Would you wish to have similar WOLF material made available on other modules?	89.13	10.87
		Replace	**Support**
8	Would you prefer to have WOLF material to replace (R), or support (S), theory delivered within lectures?	17.39	82.61
		Yes	**No**
9	Would you prefer to have more WOLF material made available on this module?	89.13	10.87
10	Would you prefer for more WOLF material to be used to replace lectures?	36.96	63.04

Table 2: Student responses from the January questionnaire.

		Yes	No
3	When informed of the availability of WOLF material at the beginning of the module, did you expect this to be of potential benefit?	82.98	17.02
4	Do you consider the replacement of lectures with WOLF material improved an understanding of microbiology?	63.83	36.17
5	Did you use WOLF for other modules?	85.11	14.89
6	If yes to the above, please specify module codes or titles:		

		More	Less	About right
7	Would you have preferred to have had less, or more WOLF material to replace lectures, or was the amount about right?	29.79	6.38	63.83
		Study	**Replace**	
8	Did you use WOLF as a general study aid (S) on this module, or only for material replacing lectures (R)?	80.85	19.15	
		Yes	**No**	
9	Were you able to access WOLF with relative ease using University facilities?	93.62	6.38	
10	Do you have internet access readily available outside the University?	80.85	19.15	
11	Did you access WOLF via the internet outside the University?	74.47	25.53	
		Home	**Work**	
12	If yes to the above, where was this access provided (eg home, work, etc)?	90.32	9.68	
	(Of yes respondents)			
		Yes	**No**	
13	Did you find the flexibility of using WOLF for studying to be of benefit?	91.49	8.51	

Evaluation and Benefits

The intention of the study was essentially two-fold, namely:

- to determine the impact of lecture replacement with WOLF on student performance
- determine the students' perspective on this approach.

A methodological approach similar to those published by others[4,5], was used. This was by analysis of student performance within the three multiple choice tests (Figures 1-3), it is apparent that although for each test the percentage correct was marginally lower for WOLF derived material, this variation was not statistically significant ($p < 0.05$). The conclusion, therefore is that the replacement of a relatively small number of lectures with WOLF did not influence test performance, as seen by either an improvement or worsening of test performance. Since test performance is at least in part used to determine whether module outcomes have been met, WOLF replacement did not prejudice successful completion of the module.

Lecture replacement by WOLF also represents a reduction in staff contact and a contribution to efficiency gains. Although this represented only a small reduction in workload, anecdotally, staff were appreciative of the opportunity to devote the occasional extra uninterrupted afternoon to research or other scholarly activity.

From questionnaire responses (Tables 1 and 2), of the main areas of interest for this study such as, whether students considered the use of WOLF to aid study and understanding of the subject, attitude towards lecture replacement, flexibility of study and the perception that WOLF material improved performance, responses to these aspects were all favorable. It was also reassuring that 80.9% of respondents indicated that they used WOLF as a general study aid, rather than solely to derive material deliberately removed from the

lecture portfolio. There did, however, appear to remain a reluctance to remove lecturing to any greater extent with 63.8% considering the amount of lecture material replacement to be "about right", while only a sizable minority of 29.8% would have preferred for "more" WOLF material to replace lectures.

Future developments

It is apparent from this study that that use of WOLF was identified as a beneficial means of study which assisted in the achievement of the learning outcomes of the module.

The intention for 2003/2004 is to repeat the exercise and to explore adoption of the strategy onto other modules.

References

1 Geertshuis, S., Sambrook, S., Willis, R., Holmes S. & Cheseldine D. (2000) Innovations in curriculum design: developing a system to assure the pedagogical quality of computer based learning materials**.** *Scottish Journal of Adult and Continuing Education*, 6(2) pp 43-53.

2 Bennet, G. & Green, F. P. (2001) Student learning in the online environment: no significant difference? *Quest* 53(1) pp 1-13

3 Quality Assurance Agency: Distance Learning Guidelines. Accessed 8th September, 2003. http://www.qaa.ac.uk/public/dlg/append1.htm

4 Soyibo, K. & Hudson A. (2000) Effects of computer-assisted instruction (CAI) on 11th graders' attitudes to biology and CAI and understanding of reproduction in plants and animals. *Research in Science & Technological Education*,18(2) pp 191-199.

5 Huppert, J. Yaakobi J. & Lazarowitz R. (1998) Learning microbiology with computer simulations: students' academic achievement by method and gender. *Research in Science and Technological Education,* 16(2) pp 231-245.