

Lecture substitution by technology supported learning (WOLF) - an investigation of effectiveness on the module Introductory Microbiology

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Lecture substitution by technology supported learning (WOLF) – an investigation of effectiveness on the module Introductory Microbiology

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Background and rationale

The Introductory Microbiology topic within the Wolverhampton Online Learning Framework (WOLF) has been developed over a number of years. The topic contains the whole of the module syllabus in an interactive form, including lecture material, tutorials and laboratory practical support. The topic also contains tests for student self-assessment.

The material has traditionally been used as a student support mechanism, although in recent times it has also been used as a direct substitution of a proportion of formal lectures. This project was devised to determine the effectiveness of this strategy in relation to student performance and to integrate the University pilot of computer assisted assessment (QMark), since multiple choice testing is used on the module.

The research

Three areas were investigated:

- The effect of lecture substitution with WOLF on test performance
- The students' opinion of lecture substitution by WOLF and the use of computer assisted assessment
- The relationship between WOLF usage and student performance

Relative student performance was assessed by analysis of student responses to questions within module tests. The theoretical aspects of the module were assessed by multiple choice tests. For test 1, questions were derived from lecture material. For test 2, questions were derived from WOLF material. Relative performance was analysed between tests 1 and 2.

In addition, Test 1 was paper based with the students requested to select one correct option from within a list of distracters. The remaining tests were computer based using QMark. The computer assisted assessment tests were multiple-choice, with one question per screen and one correct option per question. The facility to use HTML in test construction enabled the integration of pictures and animated images to form the basis of a proportion of the questions. The simultaneous use of the computers (96 available within a single room) enabled assessment of all students on the module at the same time. Question order and item order were both randomized. Relative performance on the tests was analysed.

The views of students concerning the strategy of lecture substitution and computer assisted assessment were determined by the use of a questionnaire distributed following the final test.

The outcomes

Lecture versus WOLF test performance

Figures 1 and 2 represent the percentage of correctly answered questions for tests 1 and 2 respectively.

Figure 1: Percentage of correct responses per question for test 1 (n=79).

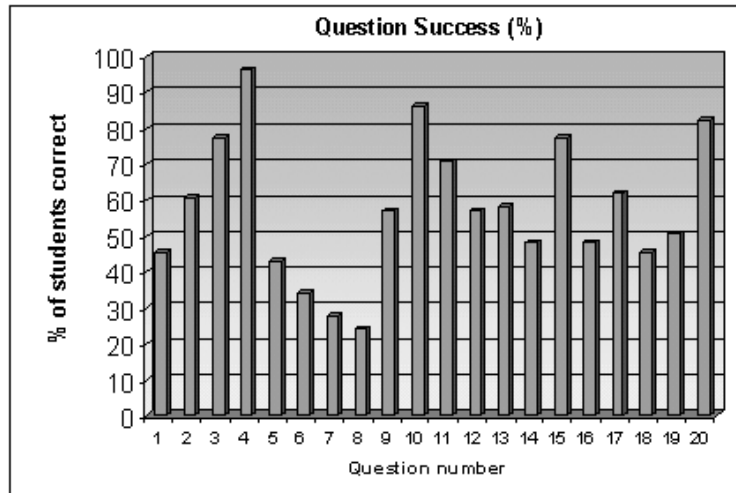
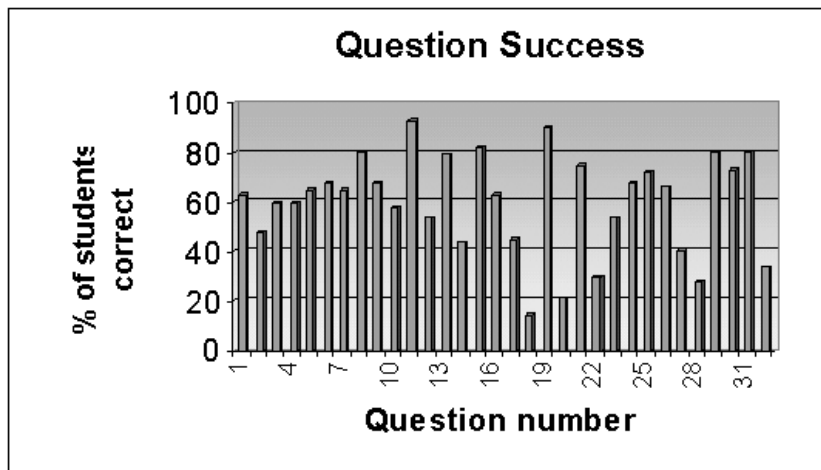


Figure 2: Percentage of correct responses per question for test 2 (n=71).



Answers from questions derived from lectures (test 1) and those from WOLF (test 2) were analysed. The results indicate that for questions derived from lecture material, 57.6% of questions were answered correctly and for questions derived from WOLF material, 59.9% were answered correctly.

Questionnaire Responses

A questionnaire was distributed to all students who attended the final test on the module. The intention of the questionnaire was to determine the attitude of the students towards lecture substitution and the use of computer assisted assessment.

Table 1 below summarises the responses (n=58).

Table 1: Student responses from the January 2004 questionnaire.

	Yes	No			
1					
When informed of the availability of WOLF material at the beginning of the module, did you expect this to be of potential benefit?	93.1	6.9			
2					
Do you consider the replacement of lectures with WOLF material improved an understanding of microbiology?	84.5	15.5			
3					
Before the module began, did you expect to have electronic sources of information (WOLF) made available on this module?	34.5	65.5			
4					
Do you consider the replacement of lectures with WOLF material to benefit study?	79.3	20.7			
			More	Less	About Right
5					
Would you have preferred to have had less, or more WOLF material to replace lectures, or was the amount about right?	19.0	8.6	72.4		
			R	S	
6					
Did you use WOLF as a general study aid (S) on this module, or only for material replacing lectures (R)?	10.3	89.7			
			Yes	No	
7					
Were you able to access WOLF with relative ease using University facilities?	96.6	3.4			
8					
Would you prefer to use a computer system (c) or paper system (s) for tests?	77.6	22.4			

WOLF usage and module performance

An analysis of WOLF usage (as determined by individual student access automatically monitored and recorded by the WOLF system) and overall module performance for individual students was undertaken.

Figure 3 below illustrates the relationship between WOLF use and eventual overall module performance.

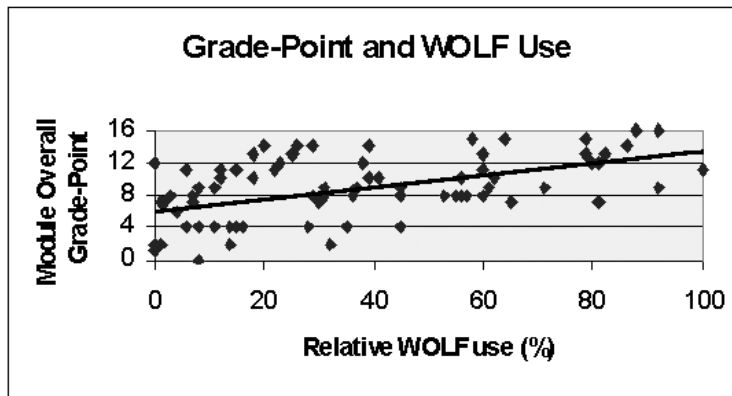


Figure 3: Module average against WOLF use.

From the positive slope of the regression analysis in Figure 3, it is apparent that there is a general trend relating increasing WOLF use with increasing overall module grade-point.

Evaluation and Benefits

The principal outcomes of the study were:

- Comparison of test performance between tests 1 (lecture material) and test 2 (WOLF material) indicated a marginally improved, although not statistically significant ($p < 0.05$), test performance in relation to WOLF derived questions.
 - This outcome supports the notion that the substitution of a proportion of lectures with WOLF material is pedagogically reliable
- Responses from the questionnaires gave positive feedback on both the strategy of lecture replacement and the use of computer assisted assessment
 - Although a majority considered the quantity of lecture replacement to be appropriate, it was apparent that WOLF was being used not only to cover substituted lectures, but also as a general study aid in the subject area
- Over three quarters of respondents preferred using the computer assisted assessment system, which enabled rapid results feedback
- Overall module grade-point and WOLF use were directly related
- This relationship illustrates the beneficial usefulness of WOLF as a study aid

Future developments

Future work will continue to improve the Introductory Microbiology topic on WOLF and further expand the use of the system for module delivery.