Changes in use of technological methods of teaching and learning in undergraduate pharmacology in UK higher education

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Abstract

A survey of methods of teaching and learning used in pharmacology in UK Higher Education was conducted in 1996 (Markham et al. 1998). A further survey involving 342 UK pharmacologists has now (2001) been conducted, and with respect to 1996, the findings were as follows:

  a. there has been a large drop (78% to 33%) in the utilisation of chalk and talk lectures and there is high use of *PowerPoint* presentations (60%);
  b. there has been a large increase in the more than occasional utilisation (23% to 62%) of CAL materials;
  c. utilisation of video material has increased markedly (13% to 28%);
  d. there has been a small increase in the utilisation of problem based learning;
  e. self- and peer assessment by students is not used extensively and use is little changed since 1996;
  f. there has been a small improvement in the encouragement/support/recognition provided by institutions for teaching; and
  g. the adequacy of IT hardware/support/resources for teaching has improved from 1996 when resources were viewed as inadequate.

Teaching staff have increased use of technology-based teaching and are now much more positive about its availability and use. This may reflect the operation of a variety of programs, aimed at increasing technology-based teaching, operating during the period.

Introduction

In 1996 a survey of the methods of teaching and learning used in teaching pharmacology in UK higher education was conducted (Markham et al. 1998). This survey was primarily concerned with technology-based teaching and aimed to:

  1. determine the extent to which non-traditional teaching and learning methods were used (with particular reference to technology-based methods);

2. find what factors influenced pharmacology teachers in deciding whether to use traditional or non-traditional methods;
3. establish the perceptions of pharmacology teachers with regard to the possible benefits of non-traditional teaching methods; and
4. determine if pharmacology teachers were satisfied with the level of support and recognition by their institutions of the use of non-traditional teaching methods.

A number of initiatives which might influence the methods of teaching and learning used in teaching pharmacology have been operating since 1996. Teaching Quality Assessment (TQA) visits have been carried out by the Quality Assurance Agency (QAA) and other programs aimed at encouraging changes in teaching and learning methods have been active (e.g. the Computers in Teaching Initiative (CTI), the Teaching and Learning Technology Programme (TLTP), the Fund for the Development of Teaching and Learning (FDTL), the National Teaching Fellowship Scheme (NTFS) and the Learning and Teaching Support Network (LTSN)). In order to see if these initiatives have impacted on pharmacology teaching a second survey has recently been conducted (June 2001) and the results are reported here in comparison with those obtained in 1996.

Methods

The methodology adhered as closely as possible to that used in 1996 to enable valid comparisons to be made and is reported in full elsewhere (Markham et al. 1998). In outline, the population surveyed (anonymously) comprised pharmacologists, whose names were obtained from a variety of published directories, who were thought to be involved in teaching undergraduates. Questionnaires (responses to which were designed to be compatible with an optical mark reader for ease of data processing) were sent out during June 2001 to be returned by July 30, 2001. Responses to questions were generally required on a five point scale. The number of respondents in each category was determined and these data were processed as follows. Where the five point scale rated usage, it was: A = never; B = occasionally; C = frequently; D = predominantly; and E = always. Responses were assigned values of 1 to 5 respectively and to provide an overall usage rating (OUR) the fraction of respondents at each scale point was multiplied by the assigned value and summed to provide an OUR measure from 1 to 5. The percentage usage (PU) was calculated by taking the total of the respondents in categories C, D and E, dividing by the number of respondents to the question and expressing the result as a percentage. Where the five point scale measured agreement/disagreement with a given statement, it was: A = strongly agree; B = agree; C = neutral; D = disagree; and E = strongly disagree. The responses were assigned values of +2, +1, 0, -1 and -2 respectively and were multiplied by the percentage of respondents in each category and summed to give an agree/disagree measure of +200 to -200 (strong disagreement). For comparison, data from the 1996 survey where an equivalent question was asked is presented in square brackets [ ].

Results and commentary

The survey was distributed by post to 342 [339] pharmacologists. While the basis of the distribution was the address list used for the 1996 survey it was found that a surprisingly large number of pharmacologists had changed jobs or moved. Some of this was no doubt due to the

rearrangement and amalgamation of many of the pharmacology departments within the University of London. Ninety-eight pharmacologists on the 1996 list were identified as having moved or left teaching; some of these (52) were replaced by individuals not included in the 1996 survey while the others were included at their new addresses (but were not necessarily in the same jobs). While the survey may still be representative it should not be thought that exactly the same individuals were surveyed on both occasions. Of the 342 forms sent out 214 returns were obtained (62.5%) [59%]. Of these, 12 [14] provided no data, the individuals having no longer any involvement with teaching. The data below refer to the 202 remaining returned survey forms. Not all questions were answered on every form.

Responses to the question 'What is your present age?' are shown in Table 1. Clearly there has been a dramatic alteration in the age distribution of the respondents making returns. One explanation is that in the 5 years since the previous survey those at that time in the 41-50 group have aged into the 51-60 group and have not been replaced by a similar movement from the 31-40 group indicating that these must have been at the early part of the range in the previous survey. Equally, these differences could simply reflect a different distribution of respondents from the sample surveyed. There is a rise in the percentage in the 20-30 age group possibly indicating an encouraging influx of new teachers to the discipline.

Age Range	Percentage (2001 survey)	Percentage (1996 survey)
20-30	19	1
31-40	36	32
41-50	7	40
51-60	36	24
61-65	2	3

Table 1. Age distribution of survey respondents in comparison to the results obtained in 1996

In response to the question 'Do you have any formal teaching qualification or are you currently taking any course leading to a formal teaching qualification?', 14.7% of respondents answered 'yes' [7%]. The proportion having or taking a course leading to a formal teaching qualification has therefore doubled possibly reflecting the introduction of the Postgraduate Certificate in Learning and Teaching in Higher Education programs (PGCLTHE) for many new members of university staff. These courses generally contain information on the availability of technology-based teaching aids though they would directly affect the data returned by the survey only with respect to the relatively small numbers of respondents who had undertaken such a course.

The first set of questions related to usage of different types of teaching method or teaching aids and are shown in Table 2. The rank order of the use of the teaching methods surveyed was: e-mail (79.5%) > slides/OHP acetates (62%) = CAL (62%) > computer presentations (e.g.

PowerPoint 60%) > problem based learning (48%) > simulations (45%) > chalk/talk lectures (33%) > videos (28%) > peer assessment (24%) > self-assessment (23%). In comparison with 1996, there has been a notable increase in the use of computer aided presentations, computer aided learning materials and video material. Chalk and talk lectures have decreased considerably. It is notable that self- and peer assessment by students has remained little changed despite the documented advantages of these methods in terms of staff time and student learning outcomes (Race 2001; Hughes 1995; Hughes and Large 1993). Introduction of such methods is initially time consuming and may meet with resistance from both students and other staff all of which might contribute to the lack of increased utilisation.

The second set of questions related to agreement or disagreement with various statements designed to measure staff attitudes and views relating in particular to technology-based teaching. The results are shown in Table 3 and are overall quite positive in relation to the responses obtained in 1996. Technology-based teaching has substantially increased (Question 19), views on its popularity and effectiveness are much more positive (Questions 18 and 20), institutions are somewhat better at encouraging/supporting/rewarding teaching activity (Question 11) and both the hardware and support for technology-based teaching are substantially better (Questions 12 and 13). Factors inhibiting the use of technology-based teaching are shortage of time (Question 15) and lack of pre-prepared support materials (Question 16) rather than lack of knowledge of what materials are available (Question 14).

The survey also asked some additional questions. Only 1.5% of respondents checked the box when asked 'If you NEVER use any form of computer materials or information technology in your teaching, check this box' indicating that 98.5% made some use of information technology in their teaching. The question 'Are you aware of the existence of the *pharma-CAL-ogy* software produced as part of the TLTP program and available through the British Pharmacological Society' (Question 22) produced a 96.8% positive response and 'In your teaching do you use any *pharma-CAL-ogy* material (or the material produced by TLTP projects from which it was derived)' (Question 23) gave a 61.8% positive response.

More than 40% of respondents had heard of the LTSN Centre for Bioscience even at this early stage of its existence (1 year of operation).

Space was provided for respondents to make additional free text comments and 30 did so. These comments were diverse and the only discernable themes were along the lines of shortage of time for teaching activities because of other pressures and a perception that there was a lack of recognition of teaching activities at institutional level.

No.	Question	A	B	C	D	E	OUR	PU	Commentary
1	� chalk and talk lectures	77	53	23	25	16	2.22 [3.25]	33% [78%]	Large decrease in utilisation of chalk and talk lectures
2	� computer based	38	41	20	52	47	3.14	60%	High utilisation of computer presentations;

							OUR	PU	
	presentations (e.g. *PowerPoint*)								probably accounts for fall in use of chalk and talk
3	� computer based or web-based learning materials	31	45	77	42	3	2.7 [1.9]	62% [23%]	A large increase in the utilisation
4	� video material	61	82	51	5	0	2.0 [1.8]	28% [13%]	Increased markedly
5	� slides or OHP acetates	38	39	26	44	55	3.2	62%	
6	� problem based learning	39	63	62	30	4	2.47 [2.35]	48% [37%]	Small increase in utilisation
7	� email or web-based facilities for communication with students	22	18	29	54	72	3.69	79%	Now very widely used
8	� self-assessment by students	102	52	30	12	4	1.82 [1.8]	23% [17%]	Small increase
9	� peer assessment by students	101	52	30	15	3	1.81 [1.7]	23% [17%]	Small increase
10	� simulations of situations	45	65	62	27	3	2.38	45.5%	Substantial current use

Table 2. Questions and responses measuring usage of different teaching methods and aids. The number of respondents in the A (never) to E (always) categories are shown together with the Overall Usage Rating (OUR; the fraction of respondents in each category, multiplied by an assigned value A to E = 1 to 5 respectively, and summed) and the percentage utilisation (PU, the total number of respondents in categories C, D, and E expressed as a percentage of the total respondents to the question). Comparable values from the 1996 survey are shown in square brackets [ ]. The survey form presented the question: On a 1 (never) to 5 (always) scale, how often do you use the following in your teaching.

Discussion

Interpretation of comparisons of data from surveys not involving the same populations are fraught with uncertainty. The identical respondents were not involved in these two surveys and the age distribution of the respondents had changed. To what extent this is responsible for the differences observed cannot be determined but it is noteworthy that there has been a substantial increase in the respondents in the younger age bracket who might be expected to be more receptive to the use of non-traditional teaching methods. While the results indicate attitudes have changed, it is difficult to determine if this represents a change in attitudes of individuals or a change in the responding population. Consideration of the numbers involved in this survey who were not involved in the previous survey (52, only a proportion of whom would be respondents) and the size of the changes in attitude would suggest it is unlikely that the new individuals wholly account for the overall attitudinal changes found. It is more likely that a real modification of individuals' attitudes has taken place.

No.	Statement	A	B	C	D	E	ADR	Commentary
11	Over the last 3 years (or in current employment if shorter) the environment within my unit/institution has provided more encouragement/support/recognition for teaching activities	14	82	56	26	24	+17.9	There has been a small improvement in the encouragement/support/ recognition provided by institutions for teaching in the last 3 years.
12	In my unit IT hardware resources match the requirement for widespread use of IT based teaching and learning methods	14	71	34	69	14	+1.0 [-45]	Opinion is neutral regarding adequacy of hardware resources: this represents a large improvement as 5 years ago resources were very inadequate.
13	In my unit technical support for IT does not meet demand	17	65	39	64	17	+0.5 [-46]	Opinion is neutral regarding adequacy of technical support for IT: this represents a large improvement as 5 years ago technical support was viewed as very inadequate.
14	My use of technology-based teaching materials is constrained by my knowledge of its	6	56	58	69	12	-13.4	Lack of knowledge of availability of technology-based

	availability						teaching material did not constrain its use by teachers.
15	My use of technology-based teaching materials is constrained by availability of my time to incorporate this in my teaching	47	81	43	26	5	+68.8 [+80]	There were quite strong feelings that time availability does limit initiation/use of technology-based teaching.
16	My use of technology-based teaching materials is constrained by lack of support materials to integrate technology-based teaching into my courses	15	78	60	42	6	+27.6	There is some feeling that lack of support material constrains use of technology-based teaching.
17	Use of technology-based materials in my teaching is limited by the time I spend on research/consultancy	54	50	36	36	26	+38.0 [+29]	Research/consultancy is a constraint on use of technology-based teaching materials.
18	Technology-based teaching materials are generally liked by students	22	92	61	17	4	+56.6 [-23]	Strong view that students like technology-based materials: view in 1996 was very negative.
19	Over the last 3 years (or in my present employment) my use of technology-based teaching has increased	54	109	24	4	1	+100.4	Very strong agreement that use of technology-based teaching has increased in last 3 years.
20	Technology-based teaching materials assist and encourage student learning	71	116	56	8	0	+74.6	Strong view that technology-based materials encourage student learning. An equivalent question was not asked in 1996 but related questions revealed a predominantly negative view at that time.

Table 3. Questions and responses measuring agreement/disagreement on survey questions. The number of respondents in the A (strongly agree) to E (strongly disagree) categories are shown together with the Agree/Disagree Rating (ADR; the percentage of respondents in each category, multiplied by +2, +1, 0, -1, -2 respectively and summed to give an agree/disagree measure from +200 to -200 (strongly disagree)). Comparable values from the 1996 survey are shown in square brackets [ ]. The survey form presented the question: On a 1 (strongly agree) to 5 (strongly disagree) scale, to what extent do you agree with the following statements.

The fact that only 1.5% of respondents indicated they never used technology-based materials/methods in their teaching and only 15.6% (Question 3) never use computer based learning materials indicate substantial uptake of technology-based teaching methods. The use of these methods has clearly moved beyond the 'enthusiast' and has embraced the mainstream teacher as is indicated by the increase from 23% utilisation in 1996 to 62% in 2001. From Question 23, it is apparent that 62% of respondents used materials produced as part of the TLTP program (*pharma-CAL-ogy*) indicating a substantial contribution from this source, though other programs may have contributed to the motivation to change (e.g. the TQA visits by QAA).

While use of technology-based methods has increased substantially, there has been relatively little change in the use of some other non-traditional methods such as self- and peer assessment. There is considerable scope, therefore, to alter attitudes to non-traditional teaching methods other than those which are technology-based. The survey data give no indication of any accompanying change in the pedagogical basis of teaching which may or may not have accompanied the increased use of technology-based methods. It is possible that traditional 'transference model' lectures with emphasis on content are still being given but are now presented in *PowerPoint* rather than with a stick of chalk. Any future survey needs to examine not just the use of technology-based methods but also the pedagogical basis of their use.

The changes in the use of, and attitudes to, technology-based teaching since 1996 have been substantial and may well reflect the influence of the mature programs active in the period, i.e. TLTP (phases 1, 2 and 3 in which pharmacology was strongly represented), TQA and CTI. If this is so, it is likely that the more broadly based programs currently operating (i.e. LTSN, FDLT and NTFS) will, as they mature, make an impact on teaching and learning methods more generally, particularly on the pedagogical rather than the technological underpinning.

Acknowledgements

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