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- 'docendo ac discendo' - 'by teaching and learning'

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The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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Disclaimer & Information

Foreword

As we head into the New Year of 2010, the International Journal of Clinical Skills (IJOCS) can feel justifiable pride that it has fulfilled its ambition to provide the international healthcare community with an arena for clinical skills education and research. For almost all the healthcare professions, clinical skills form the basic foundations and therefore a combined approach is absolutely what is needed for the future provision of a high quality health service.

The role of the ePortfolio in both education and continuing professional development of healthcare professionals continues to evolve as training and revalidation become increasingly important. Clinical skills are an essential element of this process and in 2010 the IJOCS will be proud to publish abstracts and papers from the 8th international ePortfolio conference hosted by ElfEL London Learning Forum 2010. Further information can be found at www.ijocs.org/eportfolio

This year will also see the launch of the new and exciting 'CliniTube' website – a free resource providing a single portal for accessing and sharing an array of information. It should be a valuable resource for students and should give teachers of numerous disciplines the opportunity to share educational materials. I'm certainly looking forward to seeing the 'Clinical Skills Lab' which should become an integral component of CliniTube and will comprise information on a variety of clinical skills.

The International Journal of Clinical Skills is a unique publication in its devotion to clinical skills. I encourage professionals all over the world to continue contributing to its on-going success. After all, our patients deserve nothing less than the best.

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E-learning in clinical education: a questionnaire study of clinical teachers' experiences and attitudes

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Abstract

Objective: To sample clinical teachers' experiences and attitudes towards the effectiveness of e-learning and how it should be utilised in medical student clinical teaching.

Methods: A self administered postal questionnaire was developed to capture clinical teachers' (1) demographic details, (2) main location and frequency of clinical teaching, (3) usage of e-learning in clinical teaching, (4) perceived IT ability, (5) attitudes and perceived impact of e-learning in clinical education, (6) perceived effectiveness of various e-learning mediums in clinical teaching, and (7) perceived impact of e-learning on specific learning domains. The questionnaire was distributed to all clinical teachers affiliated to Queen's University Belfast, UK (n=319). Responses were rated on five-point Likert scales.

Results: The response rate was 71% (227/319). Respondents reported using e-learning to various degrees in their clinical teaching. Generally they felt comfortable using computers, but were not as confident using e-learning. Overall, they felt that e-learning had made a positive impact on their ability to deliver clinical teaching, particularly in terms of standardisation of teaching and transparency of the curriculum. However, they were concerned that e-learning may encourage learner isolation and not promote learning with real patients. In terms of different e-learning mediums, teachers felt that more visually intense mediums such as clinical demonstration videos and images were more beneficial to students' clinical learning. They also felt that e-learning had a greater impact on more knowledge based domains than communication, clinical examination and procedural domains of learning.

Conclusion: Clinical teachers value e-learning in its ability to deliver clinical teaching and promote students' clinical learning. Despite being confident using computers they are less confident in using e-learning, but expressed a desire to improve these skills. They consider e-learning to be best utilised in a blended learning strategy particularly in more theoretical based learning domains, such as clinical reasoning and knowledge acquisition. However, there is still a role for e-learning in clinical skills training, particularly using visually intense mediums. Learning with real patients should always underpin clinical teaching and only ever be supplemented by e-learning – never replaced.

Introduction

With the continuing advancement of information technology, its role in medical education and healthcare delivery has proliferated. Universities have invested heavily in the development of such technology assisted learning environments in order to help deliver their curricula [1]. E-learning is now well established and integrated into most medical school degree programmes [2]. Medical students appear to be comfortable and confident in using such technologies and integrate them into their daily lives [3]. However, there have been concerns that the use of such technologies may be driven more by novelty than by pedagogical evidence [4]. A recent meta-analysis indicated that e-learning is, in most cases, comparable to other forms of teaching [5]. To this end educationalists have been encouraged to move on from comparing e-learning to traditional forms of teaching, and define how and when e-learning should be used effectively [1, 5].

Learning with real patients underpins the development of the next generation of competent and compassionate doctors [6]. Such 'bedside teaching' is vital in the progression of a medical student's clinical skills. While medical students largely support the use of e-learning in clinical skills education, there is concern that it encourages learner isolation and distracts from patient contact time [7]. Clinical teachers themselves can no longer avoid the use of technology assisted learning. The United Kingdom General Medical Council (GMC) recommends that teachers should develop and maintain a diverse range of effective teaching skills, including the engagement of e-learning [8]. To date there has been limited information to help formulate an opinion of clinical teachers' experiences on the utility and effectiveness of e-learning in clinical education.

The aim of this study is to improve our understanding of clinical teachers' experiences and attitudes towards the effectiveness of e-learning and how it should be utilised in medical education.

Methods

The study was conducted in the School of Medicine, Dentistry and Biomedical Sciences at Queen's University Belfast (QUB), United Kingdom. QUB is the only institution in the region to have a medical school. Clinical teachers affiliated with the medical school teach mainly in the university, community or hospital settings across the whole of the region. The undergraduate medical degree programme follows a five year integrated spiralling curriculum model, with clinical training focusing in years three, four and five. The curriculum is delivered in a blended approach including large and small group teaching, clinical attachments, practical sessions in a clinical skills centre and e-learning. Since 2003, students and teachers have had access to a wide range of e-learning materials produced by the institution.

A self administered questionnaire was developed by a focus group of medical educationalists and clinical teachers, following a review of the literature. The questionnaire aimed to capture clinical teachers':

1. General demographic details (sex and age)
2. Main location and frequency of clinical teaching
3. Usage of e-learning in clinical teaching
4. Perceived information technology (IT) ability
5. Attitudes and perceived impact of e-learning in clinical education
6. Perceived effectiveness of various e-learning mediums in clinical teaching
7. Perceived impact of e-learning on specific clinical learning domains

The questionnaire also allowed for free text comments about clinical teachers' perceived advantages and disadvantages of e-learning in clinical education.

The questionnaire was piloted and then posted to all clinical teachers involved in the medical degree programme at QUB (n=319). The mailing list was obtained from the University's central database of teachers involved in clinical teaching of medical students, including those located in the community, hospital and university settings.

A reminder was sent after 4 weeks. Participants' responses were rated on a five-point Likert scale (ranging from 1 = Strongly disagree to 5 = Strongly agree). Simple descriptive statistics were used to analyse the data using SPSS software (SPSS Inc., Chicago, Illinois). With regard to teachers' attitudes, further correlations were sought between significant domains derived from factor analysis and frequency of use of e-learning. Free text comments were typed and analysed by all of the investigators. Relevant themes were then identified and approved by all of the investigators. Ethical approval was obtained from the Schools' Ethical Committee.

Results

Response rate

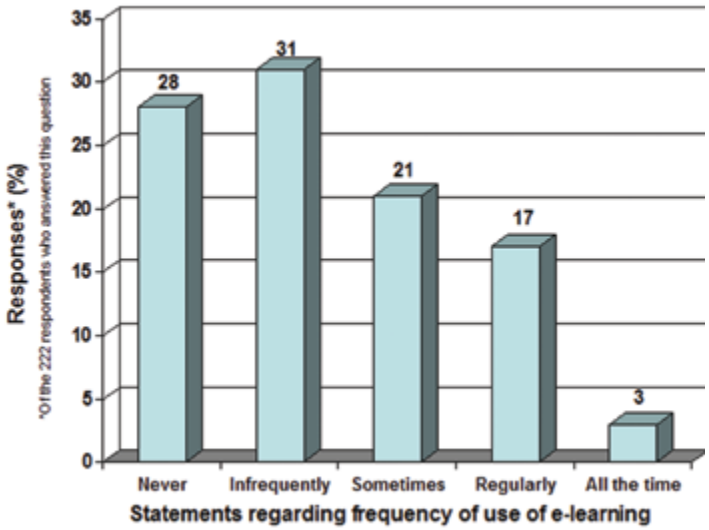
Two hundred and twenty seven responses were received giving a response rate of 71% (227/319).

Respondents' characteristics

The modal age group of respondents was 41 - 45 years of age. 69% (157/227) of respondents were male. One respondent did not give their main place of teaching. 42% (95/226) of respondents reported that their main place of clinical teaching was in the community, 33% (74/226) in hospital and 25% (57/226) on university campus.

One respondent did not give their frequency of teaching. 3% (7/226) of respondents reported to clinically teach medical students on a daily basis, 20% (45/226) 1 - 3 times per week, 33% (74/226) once a week, 12% (27/226) once a fortnight and 32% (73/226) once a month or less. Figure 1 illustrates how often teachers reported to use e-learning in the clinical teaching of medical students.

Figure 1: Teachers' responses regarding frequency of use of e-learning in clinical teaching



Perceived information technology (IT) ability

Respondents were posed with a series of statements regarding their IT ability and confidence in producing e-learning material. Their responses on a five-point Likert scale are displayed in Table 1. Overall respondents reported to be confident using IT. However, they were keen to receive more IT training particularly regarding the production of e-learning material as they lacked confidence in producing and placing e-learning materials online.

Table 1: Results of clinical teachers' responses regarding their perceived IT ability and confidence in producing e-learning material

No.	Statement	†Minimum score	†Maximum score	*†Mean score (95% CI)	Standard deviation
Q 11	I am confident using a computer	1	5	4.26 (4.36 – 4.16)	0.78
Q 15	I would like to know more about producing e-learning objects or material	1	5	3.98 (4.09 – 3.87)	0.88
Q 16	I require further IT training	1	5	3.83 (3.95 – 3.71)	0.91
Q 12	Generally I am confident using e-learning as a teaching method	1	5	3.45 (3.58 – 3.45)	0.98
Q 13	Generally I am confident producing e-learning teaching material	1	5	2.74 (2.88 – 2.60)	1.09
Q 14	Generally I am confident placing e-learning material on the web	1	5	2.37 (2.51 – 2.23)	1.09

**In descending order of the mean score for each question*
†Scores on a five-point Likert scale ranging from 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree and 1=Strongly disagree.

Teachers' attitudes towards e-learning on medical students' clinical learning

Teachers were asked to respond, on a five-point Likert scale, to a series of statements regarding aspects of e-learning in clinical teaching and learning. Table 2 summarises their responses.

Largely respondents felt that e-learning had a positive impact on students' clinical education. They felt that e-learning allowed greater standardisation of teaching over a large geographical campus and promoted greater integration of the curriculum. The ability to share teaching materials with other teachers was also seen as a positive feature of e-learning. However, teachers felt that e-learning was less likely to encourage students to proceed onto examining real patients.

Table 2: Teachers' responses regarding their attitudes towards e-learning in clinical education

No.	Statement	†Minimum score	†Maximum score	*†Mean score (95% CI)	Standard deviation
Q 15	Overall e-learning has a positive impact on student learning	1	5	3.87 (3.96 – 3.78)	0.68
Q 28	E-learning enables more effective teaching over a large geographical campus	2	5	3.76 (3.85 – 3.67)	0.70
Q 20	I am happy to share learning material on the web with other schools or departments	1	5	3.74 (3.84 – 3.64)	0.73
Q 23	Generally e-learning encourages self directed learning	1	5	3.72 (3.82 – 3.62)	0.75
Q 30	E-learning improves standardization of teaching	2	5	3.70 (3.80 – 3.60)	0.77
Q 18	Generally e-learning encourages students to work on their own rather than in teams	1	4	3.64 (3.74 – 3.54)	0.76
Q 29	E-learning allows greater integration of the curriculum	2	5	3.60 (3.70 – 3.50)	0.77
Q 21	E-learning allows effective student feedback	1	5	3.44 (3.53 – 3.35)	0.71
Q 24	E-learning has made a positive impact in my ability to teach students	1	5	3.25 (3.37 – 3.13)	0.89
Q 27	Generally e-learning has allowed me to use my teaching time more efficiently	1	5	3.12 (3.23 – 3.01)	0.82
Q 17	Male students tend to favour e-learning more than female students	1	5	3.08 (3.18 – 2.98)	0.65
Q 19	Generally e-learning promotes inter-professional education	1	5	3.08 (3.17 – 2.99)	0.73
Q 16	Generally e-learning encourages superficial learning	1	5	2.93 (3.02 – 2.84)	0.73
Q 31	E-learning is not feasible due to the lack of IT internet access in my teaching environment	1	5	2.62 (2.73 – 2.51)	1.09
Q 25	In my experience e-learning is simply a novelty	1	5	2.54 (2.65 – 2.43)	0.83
Q 26	In my experience e-learning is merely a 'digital text' or 'book on a screen'	1	5	2.54 (2.65 – 2.43)	0.81
Q 22	Generally e-learning encourages students to examine real patients	1	5	2.47 (2.59 – 2.35)	0.88

**In descending order of the mean score for each question*

†Scores on a five-point Likert scale ranging from 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree and 1=Strongly disagree.

Perceived impact of different e-learning mediums on medical students' clinical learning

On a five-point Likert scale, teachers were asked to consider the impact of different e-learning mediums on students' clinical learning. Table 3 displays their responses. Overall visually intense mediums such as clinical videos and images were thought to have the greatest impact.

Table 3: Results of clinical teachers' responses regarding the impact of different e-learning mediums on students' clinical learning

No.	Statement	†Minimum score	†Maximum score	*†Mean score (95% CI)	Standard deviation
Q 29	Clinical or demonstration videos	2	5	4.27 (4.36 – 4.18)	0.71
Q 28	Images	1	5	4.13 (4.22 – 4.04)	0.68
Q 31	Interactive virtual clinical cases	1	5	3.90 (4.00 – 3.80)	0.76
Q 34	Assessment	2	5	3.61 (3.72 – 3.50)	0.81
Q 36	Guided or moderated hyperlinks	1	5	3.44 (3.54 – 3.34)	0.75
Q 35	E-portfolios	1	5	3.39 (3.51 – 3.27)	0.88
Q 27	Simple descriptive or text documents	1	5	3.34 (3.46 – 3.22)	0.90
Q 33	Video lectures	1	5	3.32 (3.43 – 3.21)	0.87
Q 32	Pod or web casts	1	5	3.23 (3.33 – 3.13)	0.77
Q 30	Moderated 'netiquette' discussion boards	1	5	3.21 (3.30 – 3.12)	0.67

**In descending order of the mean score for each question*
†Scores on a five-point Likert scale ranging from 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree and 1=Strongly disagree.

Perceived impact of e-learning on specific domains of clinical proficiency

Teachers were asked to consider a range of learning domains in clinical education. On a five-point Likert scale they were asked if e-learning enhanced medical students in becoming competent in these areas. Table 4 displays their responses. It appears that the more theoretical based domains such as knowledge based skills, data interpretation and problem solving were considered by teachers to be enhanced by e-learning. However, more psychomotor and communication domains (such as procedural skills, communication skills and examination skills) were considered less likely to be enhanced by e-learning.

Table 4: Results of clinical teachers' responses regarding the perceived impact of e-learning on specific domains of clinical proficiency

No.	Statement	†Minimum score	†Maximum score	*†Mean score (95% CI)	Standard deviation
Q 37	Knowledge based skills	1	5	3.85 (3.93 – 3.73)	0.64
Q 42	Data interpretation	1	4	3.77 (3.85 – 3.69)	0.69
Q 44	Problem solving	1	5	3.52 (3.61 – 3.43)	0.68
Q 41	Synthesis of clinical information and diagnostic skills	1	5	3.44 (3.55 – 3.33)	0.78
Q 43	Decision making skills	1	5	3.33 (3.44 – 3.22)	0.80
Q 45	Patient safety	1	5	3.00 (3.11 – 2.89)	0.83
Q 40	Patient examination skills	1	5	2.92 (3.06 – 2.78)	1.12
Q 46	Professionalism	1	5	2.75 (2.86 – 2.64)	0.85
Q 39	History taking skills	1	5	2.75 (2.87 – 2.63)	0.93
Q 38	Communication skills	1	5	2.69 (2.81 – 2.77)	0.88
Q 47	Performing clinical procedures	1	5	2.61 (2.75 – 2.47)	1.05

**In descending order of the mean score for each question*
†Scores on a five-point Likert scale ranging from 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree and 1=Strongly disagree.

Factor analysis was used to group stems relating to teachers' attitudes into three broad domains: (1) 'Positive aspects of e-learning' domain (Cronbach's alpha = 0.812), (2) 'Negative aspects of e-learning' domain (Cronbach's alpha = 0.688), and (3) 'Positive effects on teaching of e-learning' domain (Cronbach's alpha = 0.711). The three domains were then correlated against frequency of use of e-learning. There was a significant correlation between perceiving e-learning and a positive effect on teaching skills, and using e-learning on a frequent basis (rho = 0.533, $p<0.001$).

Respondents who scored highly on the 'Positive aspects of e-learning' domain were also more likely to use e-learning on a frequent basis (rho = 0.427, $p<0.001$); similarly, there was a correlation (rho = 0.247, $p<0.001$) between a low score on the 'Negative aspects of e-learning' domain and frequency of use of e-learning. This suggests either that those with more positive attitudes are likely to employ e-learning in the first place, or that those who have used it most extensively have gained mainly positive experiences with it.

Qualitative analysis of teacher's comments

Respondents free text comments regarding the advantages and disadvantages of e-learning in clinical education were analysed for themes. 59% (133/227) of respondents provided comments. Table 5 summarises the identified themes and associated representative comments.

Table 5: Themes identified in qualitative analysis of clinical teachers' comments regarding advantages and disadvantages of e-learning in medical students' clinical learning

Theme	Sub-theme	N	Representative quote(s)
Curriculum delivery	Standardisation of teaching	38	'Produces consistency of teaching and learning'; 'So many ways of performing clinical skills – e-learning helps to standardise this'
	Access and diversity of learning materials	29	'Useful to demonstrate clinical signs which can be difficult to access (just when you need them) with real patients'; 'Allows students and teachers to access a wide range of material when and wherever they want'
	Teaching delivery over a large campus and audience	10	'Reaches a large audience in different sites – especially in general practice'
	Use of multi-sensory mediums	9	'Able to illustrate concepts better (e.g. by videos, animation)'; 'Access and demonstrate information hard to obtain e.g. murmurs, rubs etc. Students enjoy this'
	Delivery of curriculum in a 'blended' approach	7	'Complements traditional teaching but should never replace bedside teaching'; 'Should only ever be supplemental'
	Curriculum integration	5	'Able to 'flit' from topic to topic quite easily e.g. examining the cardiovascular system, review an ECG with atrial fibrillation and then discuss warfarin treatment'
Learner, teacher and patient interaction	Potential distraction from exposure to real patients	30	'Encourages students that real patient contact is less important'; 'Risk of replacing valuable bed side experience'; 'I find technology the focus rather than the patients'; 'There is a need for patient contact to develop skills of a good doctor'
	Communication skill development	9	'Produces (e-learning) poorer communication skills'; 'lack of instant patient reaction – e.g. eye contact when examining tender abdomen'; 'Not interacting with other health care professionals'
	Group learning dynamics; risks of learner isolation	8	'Easy to become isolated; 'Ability to pitch their own standards with peers is lost'
	Reduced learner – teacher interaction	8	'Less likely to identify weak students at an early stage'; 'Nothing will ever replace mentoring and personal contact with students; 'Distances students from teachers'; 'Unable to give feedback on examination technique'
Learner factors	Reflective learning	13	'Allows students to review their clinical skills against a standard and improve on next time'
	Allows students to learn at own pace and advance planning of their studies	11	'Enables students to review material at their pace in their own time'; 'Students have been able to look at a topic prior to seeing patients'
	Appeals to students	5	'Appeals to this generation of students'
IT infrastructure	Need for improved IT hardware, training and support in clinical teaching environments	19	'Inadequate IT support on wards'; '6 students huddled around a screen in general practice not good – need a data projector'
	Need for support with e-learning material production	16	'Very time consuming to produce e-learning materials'
	Lack of connectivity and access speeds in clinical environment	7	'Streaming slow for videos'; 'Access in hospital variable'

Comments from 133 clinical teachers were analysed; 'N' indicates the number of comments for a given theme

Discussion

The results of this survey provide us with the attitudes and experiences of a large cohort of clinical teachers. Overall they appear to value e-learning and consider it to have a role in clinical teaching. However, they voice some concerns about the impact of e-learning in clinical training, particularly learner isolation and potential for distraction from learning with real patients.

Doctors involved in teaching need to ensure that they are adequately skilled to provide effective teaching [8]. The clinical teachers that we surveyed generally appeared confident using computers. Their confidence did not extend to using e-learning, particularly in the production of e-learning teaching materials. However, willingness was expressed by teachers to improve their e-learning skills. While it could be argued that e-learning packages are best developed by experienced e-learning developers, the contribution that can be made by clinicians to the development of such learning packages is critical and should be actively encouraged and supported.

Despite a lack of confidence in using e-learning, respondents considered e-learning to have made a positive impact on their ability to deliver clinical teaching. Over the last decade there has been a significant increase in the intake of medical students into UK medical schools [9]. With such increases in numbers and the wide geographical distribution of clinical attachments, clinical teachers have welcomed the contribution that e-learning has made in meeting some of these educational challenges. Not only by providing efficient means of circulating teaching materials, but also by allowing greater transparency and access to the curriculum. Such ease of access appears to give teachers a greater knowledge of the curriculum and more opportunities to integrate their teaching with other aspects of the curriculum.

By the very nature of clinical teaching, students are often taught in small groups or as individuals in clinical attachments. As with many clinical skills and procedures, students are often presented with different methods of how to perform such tasks. It appears that clinical teachers appreciate e-learning's ability to help standardise their teaching, and ultimately student learning. This is of particular importance with the ever increasing use of objective and standardised assessment methods in clinical education [10]. Moreover, e-learning provides the opportunity to share learning packages between institutions and indeed other healthcare disciplines (i.e. reusable learning objects) – a view echoed and supported by the respondents to this survey.

As well as having a positive impact on teachers' ability to provide clinical teaching, respondents to this survey also felt that e-learning had a beneficial effect on students' learning. However, concerns were expressed that e-learning may encourage students to learn on their own rather than in teams. In a discipline where team work is key to successful patient outcomes, such concerns about learner isolation need to be acknowledged and steps taken to minimise isolated learning; this is especially true with interdisciplinary learning. Furthermore, respondents felt that the reduction of teacher-student interaction may impair the early identification of weaker students.

The ultimate goal of any medical degree programme is to develop the knowledge, skills, attributes and behaviours of students that will enable them to provide competent and compassionate care to patients [6]. Of all the different types of teaching methods, learning with real patients is arguably the most important method of progressing students' clinical skills. While respondents felt that e-learning had a positive impact on students' development, they highlighted the potential for such learning to discourage students from interacting with real patients. As in most teaching programmes, e-learning is only one of several different types of teaching methods. With the developing research agenda regarding how we should best use e-learning in clinical learning we must ensure that the evidence base guides us in utilising e-learning effectively in combination with other teaching methods, particularly with bedside teaching.

E-learning provides the opportunity to utilise different multi-sensory mediums in student learning. Through the experiences of the clinical teachers in our survey, they acknowledged the importance of visually intense mediums such as clinical demonstration videos and clinical images. The fact that the learning of many clinical skills, such as physical examination and procedural skills, are by nature visually demanding would support the findings in this survey. Virtual patients are increasingly being used in medical education [11]. Such learning packages provide learners with a simulation of real life clinical scenarios for the purpose of medical training. The clinical teachers who responded to this survey supported the use of virtual patients in students' clinical learning. They allow students to develop their skills of clinical reasoning, being able to collate and integrate clinical information from various sources and arrive at a diagnosis and management plan.

Teachers in this survey were asked to consider the impact of e-learning on a variety of specific clinical learning domains. Their responses would suggest that they favour the use of e-learning in more theoretically based clinical domains such as knowledge acquisition, data interpretation and clinical reasoning skills. Furthermore, they considered e-learning to have a lesser impact on developing student's professionalism, communication and practical based skills. This finding could be supported by the fact that such skills are best developed with real patients in the clinical environment.

The findings of this study have to be considered within its limitations. The questionnaire that we used has not been validated by prior research. While we achieved an excellent response rate, our sample only represents clinical teachers in one region of the UK. Due to the anonymised nature of the questionnaire we are unable to compare the characteristics of respondents to non-respondents. Furthermore our results may not be truly generalisable due to variations in medical schools curricula, teacher demographics and usage, and availability of electronic teaching materials.

Conclusion

In conclusion this survey provides us with the experiences and attitudes of a large cohort of clinical teachers who have used e-learning in their teaching of medical students. Overwhelmingly they feel that e-learning has its place in clinical teaching and

generally feel that it has a positive impact on their teaching delivery and student learning. They consider e-learning to be best utilised within a blended learning strategy.

More theoretical based clinical learning domains such as clinical reasoning and knowledge acquisition, may lend themselves more naturally to e-learning. Yet there is still a role for e-learning in clinical skills training, particularly using visually intense media for the more psychomotor based clinical learning. Learning with real patients should always underpin clinical teaching and only ever be supplemented by e-learning – never replaced.

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- ➔ History taking skills
- ➔ Communication skills
- ➔ Clinical examination/interpretation skills
- ➔ Practical skills

Not only will this valuable resource provide material to students as a learning tool and revision aid, for example, OSCEs, it will also offer educational materials for teachers from all disciplines, allowing some standardisation of practice. The Clinical Skills community will also be encouraged to contribute, making this database interactive.

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