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E-learning for education in primary healthcare—turning the hype into reality: A Delphi study

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Abstract
Objective: E-learning has the potential to provide effective education for general practice, but there are significant difficulties that must be overcome. *Design:* We initiated a two-round Delphi study, aiming to identify expectations and barriers to e-learning in primary healthcare education. *Methods:* We distributed questionnaires to 60 primary care experts who are also experts in the field of e-learning. Their responses were independently analysed by two of the authors (J.G., H.C.V.) and were clustered to form 32 themes. These were fed back to the participants in a second postal questionnaire with the objective of reaching agreement or disagreement, with a cut-off of 80%. *Results:* The response rate was 67% ($n = 40$) in the first and 60% ($n = 36$) in the second round. The extent of agreement reached ranged from 8% ("e-learning is displacing practical teaching and learning") to 97% ("e-learning needs convincing didactical concepts"). Agreement was high with the themes "e-learning gets a new focus by mixed learning concepts" and "users will have a higher level of media competence 5 years from now" (94% each). There was a positive attitude to e-learning, but there was concern about the lack of orientation towards users' needs and the poor development of innovative didactical concepts. In implementing e-learning in primary care, education should be independent of financial influence from the healthcare industry in order to eliminate conflicts of interest.

Conclusion: The experts' responses show that e-learning in primary healthcare education can contribute substantially to undergraduate, graduate, and continuing medical education, and should therefore be evaluated in systematic studies.

Key words: *medical education [MeSH], primary health care [MeSH], e-learning*

Introduction

There are two methods subsumed under the word "e-learning": distance learning using information technology to deliver educational instructions to learners, and computer-based learning using computers (and the web) to aid in the delivery of stand-alone multimedia packages for learning (1,2). There are some benefits of an e-learning approach to educational materials: educational content can be easily updated, provided to meet individual learning needs, and can be delivered at any time and in any place, depending on the technology used (3–5).

Content can be delivered using web-based methods or CD-ROM. Learner-to-learner or learner-to-trainer communication can be facilitated by means of discussion boards or weblogs, and learning strategies can be managed by virtual learning environments and electronic portfolios (6–8). Reviews show that e-learning approaches have a similar effect on outcomes, such as learners' knowledge and learner satisfaction, as traditional approaches such as face-to-face teaching (9,10). There is an increasing number and variety of e-learning opportunities available for primary healthcare education (2). In Germany, it has come from a range of sources,

including government policies, professional organizations, and commercial companies (11).

The potential benefits of e-learning will only be realized if the barriers are considered. Our aim was to identify the barriers and challenges faced by German medical educators and their attitude towards using e-learning in primary healthcare education.

Methods

A modified Delphi method was chosen (12,13). The essence of the Delphi method is that it derives quantitative estimates from qualitatively generated statements (14). This study included participants from the first German conference for medical educators on e-learning in primary healthcare (15) and used a two-round questionnaire procedure. The first round employed an explorative questionnaire (free-text answers) with 15 items guided by general aspects derived from the literature regarding the use and attitudes to e-learning in general practice training (undergraduate, postgraduate, and continuing medical education). J.G. and H.C.V. analysed the responses, identifying statements and clustering relevant major topics by using qualitative text analysis (16)—re-validated by A.S. and U.M.W. Quotes that illustrated negative or positive attitudes were included to get the contextual information on which respondents based their positions. In the second round of the Delphi method, a set of 32 statements was fed back via postal questionnaire to all participants, who then agreed or disagreed with the statements. No information was fed back to the participants regarding their previous personal statements or the frequencies of certain answers. Non-responders received one follow-up call. This practice confers anonymity to all participants and allows opinions to be expressed without peer group pressure. The responses from the second round were analysed using descriptive statistics (frequencies/ rate). We accepted a cut-off of 80% agreement as a consensus.

Results

In the first round, the response rate was 40 out of 60 participants (67%), in the second round 36 out of 60 (60%). The reason for non-responding was mostly "lack of time". The respondents had a mean age of 48.3 (SD 9.2) years, 75% were male, 69% were qualified as general practitioners, 59% were academics, 80% had experienced e-learning as users, and 48% as designers. They were active in undergraduate and postgraduate education in primary healthcare.

Scopes of benefit

The participants estimated that e-learning is most beneficial in vocational training for GP specialization (83%) and for continuing medical education (94%). Learners who should be particularly targeted are undergraduate (92%) and postgraduate (94%) medical students. Paramedical staff or patients are not seen as having much benefit. Virtual clinical case studies (89%) and transferring updated medical knowledge (88%) were seen as the most important fields of e-learning. Mixed learning approaches that facilitate learning by the effective combination of different modes of teaching and styles of learning are seen to offer new opportunities in general practice training (94%).

Barriers of implementation

Concerns were expressed regarding the initial high costs and resources needed to develop e-learning tools (92%). A barrier to implementation was seen in the lack of integration of e-learning into existing educational curricula (83%). The participants rejected the common fear that e-learning might replace clinical experience with real-life patients (92%). In the interviews, participants emphasized the current non-existence of didactical concepts for e-learning in primary care (100%), a lack of consideration for the user's needs (97%), and too little integration into undergraduate, postgraduate, and continuing medical education (94%). They requested that the structure of existing e-learning material be improved so that it was relevant for general practice teaching (91%). Easier access to e-learning should also be facilitated (91%).

The future

The participants expect e-learning to be used increasingly in general practice training (81%) and teachers/learners to have more competence in the use of computer media (93%) within 5 years. E-learning will also be more efficient (83%) and more cost effective (80%). Half of the colleagues expect e-learning to benefit clinical, academic, and research work. The participants' own focus is on projects with mixed learning approaches (89%) and they asked for public funding to strengthen e-learning in general practice training (81%). A need for further research into e-learning for the educational use of patient cases in a general practice setting (89%) was noted. Other topics such as computer-based communication training for students or doctors were not requested. Participants asked for more research into e-learning approaches, i.e., research which considers the special needs of user groups such as

undergraduate medical students in their community-based primary care training (89%). E-learning programmes designed for use in the educational primary healthcare setting should be investigated in studies of high methodological quality (94%). Further research is needed in the field of competences and the motivation of users of e-learning in general practice (86%). Cooperation between educators in general practice should be strengthened in the field of e-learning (83%).

Discussion

There are limitations to our study. Defining and selecting the experts to be included in the study was based on relatively weak inclusion criteria, since there was no systematic sampling. However, attendance at the first conference for e-learning in general practice shows interest in this field and highlights innovators and early adapters. The two questionnaires were designed through a qualitative approach without a formal validation process. We did not systematically test for the reliability and validity of our modified Delphi method, but an internal validation process was established by the research team (initials) as in other studies (17). Since e-learning in primary healthcare is still a new field for professionals in Germany, we included a small study sample. With regard to these limitations, we were able to identify the attitudes, uncertainties, and long-term expectations in the use of e-learning in primary healthcare education, as expressed by general practice educationalists.

Costs

The use and development of e-learning approaches are perceived to equate to high resource commitment in terms of time and finance. Institutions and employers recognize that dedicated time is required—but there seems to be a lack of appreciation of this fact. Like more traditional learning approaches, e-learning has its own organizational requirements. Studies have shown that e-learning can result in cost effectiveness in terms of instructor training time, travel costs, labour costs, institutional infrastructure, and the possibility to expand programs (18). Most e-learning approaches initially require a high level of resource allocation, and, although long-term costs will fall, there is no money left to keep projects up to date, improve them, and to implement them in the medical education curricula. Financial support from public funds or the government is favoured by German e-learning professionals in primary healthcare. E-learning content should be free from the interests of pharmaceutical and commercial companies. Private sector funding might be possible via a transparent "donation pool" (19).

Quality

E-learning approaches have proliferated and are offered by a range of various institutions and professional organizations. This may increase choice but it often results in a lack of communication, sharing, and coordination of curriculum development and implementation (20). Many current e-learning products tend not to be well adapted to the heterogeneous needs of users (21). This problem is made worse by the corresponding low levels of confidence and competence of both teachers and learners in using technology and methods of e-learning (poor "computer literacy") (22). Quality standards for educational aspects need to be developed and implemented, especially with regard to user orientation and educational methods (23). This could be achieved if healthcare institutions or professional organizations develop accreditation standards, or through a more informal approach in which peer reviews are made widely available. Integrating e-learning at an early stage of medical education (24) could make it an integral part of a GP's lifelong learning.

Conclusion

Although we found a generally positive attitude towards the use of e-learning in primary healthcare education, we were also able to identify barriers that need to be bridged. E-learning approaches and materials need to be evaluated to identify quality, usability, and effectiveness—using qualitative research methods as well as controlled study designs (25). Long-term project funding and systematic integration into medical curricula is needed in order to achieve the sustainable implementation of e-learning in medical education for primary healthcare.

E-learning is not a universal approach for medical education, but it can offer valuable methods to enhance the learning experience. All learners, educators, and policy advisers need to increase their understanding of the range of opportunities offered by e-learning.

References

1. Ruiz J, Mintzer M, Leipzig R. The impact of e-learning in medical education. Acad Med 2006;81:207–12.
2. Sandars J. E-learning for GP educators. Oxford: Radcliffe; 2006.
3. Fordis M, King JE, Ballantyne CM, Jones PH, Schneider KH, Spann SJ, et al. Comparison of the instructional efficacy of Internet-based CME with live interactive CME workshops: a randomized controlled trial. JAMA 2005;294:1043–51.
4. Davies DA. E-learning. In: Dent JA, Harden RM. editors. A practical guide for medical teachers, 2nd edition. Edinburgh: Elsevier; 2005. p. 221–7.
5. Gordon DL, Issenberg SB, Gordon MS, Lacombe D, McGaghie WC, Petrusa ER. Stroke training of prehospital providers: an example of simulation-enhanced blended learning and evaluation. Med Teach 2005;27:114–21.
6. Butzlaff M, Vollmar H, Floer B, Koneczny N, Isfort J, Lange S. Learning with computerized guidelines in general practice? A randomized controlled trial. Fam Pract 2004;21:183–8.
7. Schultze-Mosgau S, Zielinski T, Lochner J. Web-based, virtual course units as a didactic concept for medical teaching. Med Teach 2004;26:336–42.
8. McKenney R. The next level of distributed learning: the introduction of the personal digital assistant. J Oncol Manag 2004;13:18–25.
9. Bernard R, Abrami P, Lou Y, Borokhovski E. How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. Rev Educ Res 2004; 74:379–439.
10. Chumley-Jones H, Dobbie A, Alford C. Web-based learning sound educational method or hype? A review of the evaluation literature. Acad Med 2002;77:86–93.
11. Liebhardt H, Mueller M, Steinhauser S, Scholz W. A survery of sources in the fields of E-learning in medicine. GMS Zeitschrift für Medizinische Ausbildung 2006;23:23–6.
12. Pill J. The Delphi method – substance context a critique and an annotated bibliography. Socio-Economic Planning Services 1997;5:57–71.
13. Rowe G, Wright G, Bolger F. Delphi – a re-evaluation of research and theory. Technol Forecast Soc Change 1991;39: 235–51.
14. Jónes J, Hunter D. Qualitative research – consensus methods for medical and health services research. BMJ 1995;311: 376–80.
15. German Society for General Practice and Family Medicine (DEGAM), E-Learning in Primary Care Education, Frankfurt a.M., 8–9 July 2005. Available at URL: www.e-learning-allgemeinmedizin.de (accessed 10 December 2007).
16. Mayring P. Qualitative Inhaltsanalyse. Forum: Qualitative Social Research 1(2). Available au URL: http://www.qualitative-research.net/fqs-texte/2-00/2-00mayring-d.htm (accesed 10 December 2007).
17. Pulichino J. Future directions in e-Learning. The E-Learning Guild, 2006. Available at URL: http//www.learningguild.com (accessed 10 December 2007).
18. Gibbons A, Fairweather P. Computer-based instruction. In: Tobias S, Flechter I. editors. Training and retraining: a handbook for business, industry, government, and the military. New York: Macmillan; 2000. p. 410–42.
19. Brennan T, Rothman D, Blank L, Blumenthal D, Chimonas S, Cohen J, et al. Health industry practices that create conflict of interest – a policy proposal for academic medical center. JAMA 2006;295:429–33.
20. Harden R. Planning a curriculum. In: Dent J, Harden M. editors. A practical guide for medical teachers. Edinburgh: Harcourt; 2001.
21. Statistical indicators benchmarking the information society. Measuring the information society in the EU, the EU accession countries, Switzerland and the US. Brussels: European Commission; 2003.
22. Hoffmann M, Blake J. Computer literacy: today and tomorrow. Journal of Computing Science in College 2003;18: 221–33.
23. Barker Z. Standards and accreditation for e-learning. In: Sandars J. editor. E-learning for GP educators. Oxford: Radcliffe; 2006.
24. King R, Murphy-Cullen CL, Mayo H, Marcee A, Schneider G. Use of computer and the internet by residents in US family medicine programmes. Med Inform Internet Med 2007;32: 149–55.
25. Cook A. The research we still are not doing: an agenda for the study of computer-based learning. Acad Med 2005;80:541–8.