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WEB PAPER

Online collaborative learning for healthcare continuing professional development: a cross-case analysis of three case studies

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Abstract

There has been increasing interest in the use of computers to facilitate collaborative learning between healthcare professionals for continuing professional development but many schemes appear to be unsuccessful. The aim of the study was to identify, from a cross-case analysis of three case studies, the main factors that facilitate and inhibit online collaborative learning for healthcare continuing professional development. The intervention was an asynchronous, structured and moderated discussion board. Data were collected by semi-structured telephone interviews on a purposive sample from each case study, documentary analysis of all self-reported comments made in the discussion boards, log of technical problems and evaluation of discussion board activity. Three key factors were identified: the need for implementation based on the requirements of users, the acceptance of this approach by the user and the development of a supportive organization within which the healthcare professionals work. This study has highlighted the overall low level of activity and this would appear to be because implementation has not been based on an understanding of the healthcare context.

Introduction

Over the last decade there has been increasing interest in the use of computers to facilitate collaborative learning between healthcare professionals for continuing professional development (Sandars 2003). The impetus has come from two main factors. First, computer-based technology, mainly using online discussion boards, has developed rapidly to allow online interaction between users to take place (McConnell 2000). Second, it has become increasingly recognized that continuing professional development for healthcare professionals is most effective when there is active interaction and sharing of knowledge between individuals (Thomson O'Brien et al. 2004).

Recent National Health Service (NHS) reforms in the United Kingdom (UK) have focused on changing the way that the NHS provides care and a key component is the encouragement of healthcare professionals to learn together (Department of Health 2001), and computer-based technology to enhance learning is an important aspect (Department of Health 2001). These changes have resulted in the proliferation of online collaborative learning opportunities by a range of providers in the hope of developing active online communities of learners. Examples include the NHS Institute for Innovation and Improvement, various professional organizations, such as the Royal College of Nursing and the Royal College of General Practitioners, and several commercial organizations, such as Doctors net and BMJ Learning. These online communities of learners are informal groups that are not working towards a formal

Practice points

- There has been increasing interest in online collaborative learning for healthcare continuing professional development but many schemes appear to be unsuccessful.
- The key factors are the need for implementation based on the requirements of users, the acceptance of this approach by the user and the development of a supportive organization within which the healthcare professionals work.
- This study has highlighted the overall low level of activity and the uniqueness of the healthcare context that is outside formal education settings.
- It is recommended that further implementation is based on an understanding of the phenomenon within the healthcare context.

academic award and have been developed to share knowledge and experiences.

Our experience, as developers of e-learning approaches for healthcare continuing professional development, is that many schemes that have been developed to support online communities of learners for healthcare continuing professional development have been unsuccessful. The driving force often appears to have been based on policies that are related to aspiration and hope rather than careful consideration of the

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context within which most healthcare professionals work and learn.

The intention of performing this study is to inform future strategies and encourage implementation of online collaborative learning by communities of learners for healthcare continuing professional development. The aim of the study was to identify, from a cross-case analysis of the three case studies, the main factors that facilitate and inhibit online collaborative learning for healthcare continuing professional development.

Methods

Three case studies were studied and an 'exploratory' type of case study was chosen (Yin 2003). Yin recommends in exploratory case studies that a 'mixed methodology' is used to obtain data (Yin 2003). This approach requires the collection of both qualitative and quantitative data. Most of the collected data in the study were qualitative but additional quantitative data were collected.

Context and participants of the case studies

Case studies A and B describe online collaborative learning in existing public health networks and case study C an online study group for general practitioners that had been specifically developed for continuing professional development. The exact locations of the case studies have been made anonymous because of the sensitive nature of the results of the evaluation. All of the case studies were designed to support informal exchange of knowledge and experience.

The online groups for public health networks A and B, and the general practitioner group C, were chosen as a convenience sample. The Evidence for Population Health Unit at the University of Manchester was commissioned to provide a service to these groups.

Public health networks are voluntary networks that have been established to connect the wide variety of public health professionals who work within a geographical area, usually based on a Strategic Health Authority (Faculty of Public Health Medicine 2001). They are voluntary and have the aim of sharing professional knowledge as part of continuing professional development.

Public health network A was located in a predominantly rural area within the East Midlands and members were widely geographically dispersed with many working single-handed. Thirty-four members agreed to join and were registered to use the online collaborative learning discussion board. More women than men registered (68%) and it was a varied group by age (50% were aged 45 and above) and occupation (including Directors of Public Health, doctors and public health specialists). The administrator of the network considered that those who registered were broadly representative of this network.

Public health network B was located in a large metropolitan urban area within the North of England and many members were working single-handed. Sixteen members of the network agreed to join and were registered on the online collaborative learning discussion board. There were equal proportions of

women and men, with a median age category of 40–44 years. The participants mainly occupied less senior occupational levels (only two members were in a senior management role such as Director of Public Health). The administrator of the network considered that those who registered were broadly representative of this network, but there may be a slight bias towards members in less senior public health positions.

In the general practitioner group C, all the participants were general practitioners who provided care in a deprived inner-city area in the North of England. Originally 23 GPs agreed to join and were registered on the online collaborative learning discussion board. There were approximately an equal number of male and female GPs who registered ($n=8$ and 7, respectively). It was a varied group by age (60% were aged 45 and above), type of practice and with diverse areas of interest (including public health, dermatology, mental health, GP training, and forensic medicine for example). The local Training and Development facilitator considered that those who registered were broadly representative of the local GPs, but noted that there were several doctors who did not attend local meetings that had been organized by the Primary Care Organisation.

Intervention

The intervention was an online discussion board that had been specifically developed to support online sharing of knowledge and experiences for collaborative learning for healthcare continuing professional development. Each case study had the same intervention.

There were three components of the online discussion board intervention: the use of computer-based technology, structured activities and moderation.

Computer-based technology

The discussion boards were asynchronous and hosted within a WebCT e-learning delivery system (<http://www.webct.com>).

Structured activities

The discussion board comprised 10 structured discussions, also called activities. Each structured activity was introduced by a message from the moderator in order to guide the tasks required to be performed by the members for that activity. New activities were opened every two weeks to enable the activities to be performed in a logical sequence. An asynchronous approach allowed messages to be posted, read and responded to over a period of time. The overall approach to the structured activities followed that recommended by Salmon (Salmon 2000): there was initial socialization followed by series of clearly defined tasks in which participants were encouraged to share knowledge on a mutually agreed topic and then to consider what important lessons could be used in the future. The tasks are described in Figure 1.

1. To gain familiarity with other members of the discussion board by introducing themselves
2. To discuss individual concerns about communicating online and to suggest how they thought these could be overcome
3. To share ideas about what would make the discussion board be successful for themselves and other members of the network
4. To identify a specific issue that they had recently dealt with at work and that they thought would be a meaningful issue for the network to discuss
5. To give further information about their own issue and to send information about the other issues raised by other members of the discussion board
6. To consider the feedback received about their own issue and to give feedback to the rest of the discussion board as to how useful their information had been in helping to understand the issue
7. To summarize the information and feedback and consider whether this had resolved the issue or whether further information was required
8. To reflect on how the discussion board had helped the individual to resolve the issue
9. To reflect on the process of taking part in the discussions with other members of the discussion board
10. To send a farewell message to other members of the discussion board

Figure 1. Structured tasks of the discussion board.

Collection and analysis of qualitative data

Data were collected by semi-structured telephone interviews on a purposive sample of four members from each case study and documentary analysis of all self-reported comments made by all participants in the discussion boards of each case study. The purposive sample included a member of each case study who had agreed to join the group but never entered the discussion board, at least one member in each case study who was a high participant in each discussion board and at least one member in each case study who had low or medium participation. High participation was defined as posting over five messages, medium participation as posting between three and four messages, and low participation as posting two or fewer messages. The interview guide for the telephone interviews is shown in Figure 2.

Immediately following the tape-recorded telephone interview, the interviewer (ML) transcribed the interview. JS and ML independently identified the main points that the interviewee had made in response to each of the questions that had been asked. Any differences were discussed until consensus was reached. The main points that had been identified were returned by email to each interviewee for respondent validation. Responses were obtained from all interviewees. On confirmation that the main points had been faithfully represented, JS and ML independently further coded the data to produce several key themes, and illustrative examples for each theme were identified. Any differences recorded by each researcher were discussed until consensus was reached.

Both JS and ML independently read through all of the 65 comments in the transcripts twice. This allowed a sense of the whole experience of each individual, and of the group, to be developed. Independently, the data were reduced into

categories, which were then compared and contrasted to produce several key themes, and illustrative examples for each theme were identified. Any differences recorded by each researcher were discussed until consensus was reached. The process of respondent validation was considered not to be feasible for these data since it was expected that the response rate would be too low because of the timing of the final analysis.

Collection and analysis of quantitative data

Data were collected from an administrative log of contacts requesting technical support and from discussion board activity: the reasons given for not entering the discussion board, the number of messages posted over time and the number of discussion threads.

The number of 'hits' (the number of entries into the discussion board), the number of 'items read' (the number of messages read) and 'posted' (the number of messages sent by the member) were collected for each member. The number of discussion threads were identified by JS and ML independently reading through all the messages and noting 'threads' of messages. A thread signifies where there is a sequence of messages that are equivalent to a discussion between two or more people (Preece 2000). The lists were compared and a joint discussion between JS and ML resulted in the final list as entered into simple tables. No statistical analysis software was required since the data were minimal and simple to interpret.

Ethical aspects

Consent was obtained from the Local Research Ethics Committee within each of the areas of the case studies.

Pre-entry

- Why did they sign up for it in first place?
- What did they think they were going to get?
 - Probe:
 - technological (inc. access issues and anonymity)
 - time constraints (inside module & out)
 - support—technological, administrative & facilitator related
 - group membership
 - ownership of module

Entry

- What were their thoughts when they first entered the network?
 - Probe:
 - when first went in how feel about technology, facilitator, other members?
- Turning to the technology in particular how at ease were you with the technology used?
- Turning to the facilitators & support, how useful did you find them and what impact did that have on their participation?
 - Probe:
 - and find out what they would recommend to improve them inc. restructuring, other methods contact etc.
- Turning to the actual discussions, what was their experience of interaction with other members and what impact did that have on their participation?
- What inhibited them from contributing and how can these issues be overcome?
 - Probe:
 - technological (inc. access issues and anonymity)
 - time constraints (inside module & out)
 - support—technological, administrative & facilitator related, group membership
 - ownership of module
- What did they think helped or would help them to contribute in the future?
 - Probe:
 - technological (inc. access issues and anonymity)
 - time constraints (inside module & out)
 - support—technological, administrative & facilitator related, group membership
 - ownership of module
- What is their main recommendation on how the module could be improved to make them at more at ease and more likely to use this medium in the future?
- Are there any other recommendations that you think are critical to the success of future online networks?
 - Probe:
 - technological (inc. access issues and anonymity)
 - time constraints (inside module & out)
 - support—technological, administrative & facilitator related, group membership
 - ownership of module

Figure 2. Interview guide for telephone interviews.

All participants were sent an initial consent form by email and all participants returned a completed signed consent form. All participants who were interviewed were sent a further consent form by email at the time of arranging the interview and all participants returned a completed signed consent form.

Approach to the cross-case analysis

The logic of the use of multiple case studies researching a similar phenomenon is that the overall study is more robust (Yin 2003).

When analysis of each case study had been performed, JS and ML independently read through the results of each case study several times, noting similarities and differences between the cases. In addition, illustrative examples were noted from any of the case studies. Any differences recorded by each researcher were discussed until consensus was reached.

Results**Cross-case analysis of themes**

The results are presented as a cross-case analysis of themes identified from each case study.

Each theme is supported by reference to the participant who made the response from which it was developed. The number refers to the code for the participant and the letter refers to membership of the respective case-study group. For the telephone interviews, a note is made of the degree of participation in the discussion board.

Overall, there was no consistent pattern of responses between male and female members, or between members with different levels of online participation (never to frequent) but there were differences between the case study groups.

- Facilitating factors for online collaborative learning for healthcare continuing professional development

Sharing knowledge and collaborative learning. A motivating factor to join the discussion board for many members was to share knowledge and expertise between group members:

I am hoping to be able to have a place to discuss with and learn from each other. (197 C)

I am looking for ways to update and improve my knowledge base, particularly around Communicable Diseases and epidemiology. I also want to experience work related chat room interaction. (296 C)

Becoming part of a professional network to overcome isolation. An important aspect was also the hope that they would become part of a wider social network of professional colleagues:

I hope to meet [virtually] some new people within the... public health community and perhaps get to know better some others who I have already met. (287 B)

The need for social contact between professionals was particularly stated by members who worked in isolation from colleagues:

Because I'm quite isolated in my PCT I thought it would be a quite useful way of making connections, sharing information and work. I'm a new consultant in a public health job out in rural... There are no other public health people here. So I was out on a limb, very inexperienced. So it was another way of connecting with people. (21 A No participation)

Realization of common problems. Several members stated that a benefit of the online collaborative learning discussion board was that there was a realization that they all face the same problems (97A male, 119C):

It's been enjoyable reading everyone's messages but I don't think I have learned much about myself. Good to know we all face the same problems Bye everyone, thanks for the input. (119 C)

Curiosity. Some members joined because they were motivated by curiosity and a desire to be 'up to date':

It sounded exciting and sounded like that is where the future would be and I wanted to be part of it. (119 C Medium participation)

Improve computer skills. Some members joined because they were motivated by the desire to improve computer skills:

Thought it would help me with my electronic skills which are poor really, such as the internet and email. (108 C Low participation)

Answer specific problems. Several members expected the network to provide answers to specific problems:

Being able to raise a particular question or issue and getting some feedback on that or ideas on how to progress. You know if you have a project and you're not sure how to progress, putting it out to the network and getting a response back. (97 A High participation)

What would really have been appreciated was a method of getting quick answers to relatively simple questions. (119 C Medium participation)

Structured approach. The use of a structured approach, with clear activities, was liked by members from all three online collaborative learning discussion boards:

It did help me focus and keep my message to the point and appreciate what that week was about. Otherwise you get lots of people rambling on about their holiday. I think it keeps everyone focused and is a good idea to keep everything to a set topic rather than absurd ramblings. (97 A High participation)

- b. Inhibiting factors for online collaborative learning for healthcare continuing professional development

Use of technology. In the public health networks A and B, concerns about using the technology were frequently stated:

I think it will be very much about feeling confident to ask questions so that we can learn from the expertise and knowledge of colleagues. I think it is also about building confidence in the group to utilise this type of technology as a means of support. (96 A)

No members of the general practitioner group C expressed concern about using technology

Confidentiality. In all three networks, concerns about confidentiality of the discussions were frequently stated:

I tend to open my mouth in forums and 'think aloud' I suppose before having my own thoughts fully formed on an issue. Linked I suppose to this is a feeling of nervousness that the written word is more permanent somehow than something said aloud in a group, i.e. recordable and evidential. (207 B)

Unsure of purpose. Members from all three discussion boards often stated that they were unsure of what to expect from the discussion boards but they had hopes that it would provide an opportunity to share and learn between members, especially since many felt that would reduce their feelings of isolation from professional colleagues:

I wasn't really sure what it was but I thought it would be a promising way to contact other members of the network. I have been a member of the network for quite a while but I thought this would help me to feel more like a member of the local public health network. (264 B No participation)

Balance with competing work pressures. Several members from all three discussion boards stated that it had been useful to have the opportunity to share ideas but recognized that it was difficult to balance this form of interaction with existing work pressures:

It's not the time taking part, it's actually finding the time to make the effort when there are so many other demands during my limited time in the office. But, it's been good to be involved. (97A)

Given the need to prioritise my workload this was something that because it required the commitment that it did quite simply it fell off the achievable. (287 B High participation)

Lack of postings and interaction. Lack of postings and interaction by other discussion board members was a frequent cause of frustration:

There needs to be a more dynamic 'conversation' going on. More people, more views, more controversy. (299 B)

The discussions could have done with a few more participants. Instead the number of responses were limited. It almost became irrelevant to respond to the same issue twice due to lack of divergent or conferring views. (84A Medium participation)

I found it difficult to take seriously because there wasn't much response. (119 C Medium participation)

Table 1. Technical problems notified to technical support help desk facility.

Group and member ID	Number of problems	Category of problem
A 80	2	Access difficulties—general IT
B 107	1	Difficulty opening attachments
B 108	1	Log on difficulty
C 119	1	Password default problem
C 133 Male	1	Password default problem
C 168	3	Password default problem
C 197	2	Not receive email details

Note: The results are presented as a cross-case analysis of the three case studies.

Table 2. Reasons given for never entering the online collaborative learning discussion board.

Group and member ID	Reason given
A 80	Illness
A 81	Work commitment
B 264 Male	Work commitment
B 265 Male	Work commitment
C 124	Work commitment
C 136 Male	Work commitment
C 148 Male	Illness
C 92	Change in practice

Note: The results are presented as a cross-case analysis of the three case studies.

The quality of the discussions was also stated as factor that inhibited contributions:

Basically people used it as an excuse to have a bit of a whinge about things they didn't like. (197 C High participation)

Lack of organizational support. This was commented on several times by members of the public health networks, who felt that success of the online collaborative learning discussion board required a champion from within the organization within which they worked:

For the future, the e-module needs to be embraced by chief executives of all PCTs. Each chief executive would then encourage their public health practitioners to participate and allow/allocate time for their participation. (84A Medium participation)

No members of the general practitioner group C expressed concern about organizational support.

Technical problems

The results are presented as a cross-case analysis of the three case studies (see Table 1).

Table 3. Example of the decline in interaction over time: Discussion board A.

Week	Total postings
1	14
2	9
3	9
4	5
5	4
6	3
7	1
8	2
9	3
10	2

Discussion board activity

Eleven (32%) members entered the A online collaborative learning discussion board and, of these, six were regular and consistent contributors until the completion of the discussion board. A similar pattern was found in the B online collaborative learning discussion board in which six (38%) members entered the discussion board and all of these six were regular and consistent contributors until the completion of the discussion board. The C online collaborative learning discussion board also had a similar pattern with 13 (36%) entering the discussion board and, of these, five were regular and consistent contributors until the completion of the discussion board. There were no consistent differences between male and female members.

Analysis of the pattern of the interactions in the A online collaborative learning discussion board showed that there was an initial burst of enthusiasm in the discussion board with many messages being posted and responded to in the first two months of the discussion board operating. However, as time progressed the number of postings to the discussion began to drop and there was much less interaction. In total 138 messages were posted. A similar pattern was noted in the B online collaborative learning discussion board, in which a total of 72 messages were posted, and in the C online collaborative learning discussion board, in which a total of 140 messages were posted.

Discussion

The cross-case analysis of qualitative and quantitative data from the three case studies has highlighted a variety of factors but these can be grouped into three key factors and these will be discussed. The key factors are the need for implementation based on the requirements of users, the acceptance of this approach by the user and the development of a supportive organization within which the healthcare professionals work.

- Implementation based on the requirements of potential users

A variety of expectations and motivating factors were identified by users in the cross-case analysis. Many participants were motivated by a desire to undertake something novel, to overcome isolation and to improve computer skills. There was a clear distinction between participants who wanted an active collaborative learning environment and those who wanted a quick answer-response service. These two requirements are not mutually exclusive but require different approaches to deliver these requirements (Ackerman et al. 2003). O'Rourke et al. (1999), in their study of online collaborative learning by general practitioners, also note this difference in requirements.

There has been increasing awareness of the importance of involving users of any computer-based technology at all stages of the implementation process, not only in the initial design (Norman & Draper 1986). This impetus has been related to the realization that there is an important and dynamic interaction between the technology and the human being using the technology (Kling 1999).

- b. Implementation based on the recognition of the importance of acceptance of the approach by the user

The interrelated importance of the usability of computer-based technology to facilitate social interaction, the development of trust and the lack of confidence in using computer-based technology was identified. In a study designed to look at online interaction, Curran et al. (2003) noted that 41% of participants were concerned about making their thoughts public.

Greater insight can be gained by considering the Technology Acceptance Model that is proposed by Davis (1993). This model proposes that a potential user considers the main dimensions that are related to the computer-based technology: the perceived usefulness and the perceived ease of use. These in turn predict intention to use and actual use of the computer-based approach (Davis & Venkatesh 1996). This model has been validated in a wide range of different contexts, including healthcare (Legris et al. 2003). Venkatesh & Davis (2000) note that perceived usefulness is a strong determinant of user intention. The main components of this dimension are both social and cognitive. The social component includes behaviour that corresponds to the norm and presentation of self-image. The cognitive component includes job relevance and production of quality outputs. Prospective users of online collaborative learning for healthcare continuing professional development will initially need to be clearly given the benefits of the new approach and the users will need to perceive quickly that the online collaborative learning approach has value to them. In this study we identified some positive benefits but, like all approaches to social and behavioural change, they need to be tailored to the specific user (Iles & Sutherland 2001).

The perceived ease of use is related to both the skills of the user and the available computer-based technology (Davis & Wiedenbeck 2001). Several studies have identified low levels of computer skills (Lau & Hayward 2000) and difficulties with Internet connection and the use of equipment for various approaches to online collaborative learning for healthcare professional development (Bowers 1997; Gillibrand et al. 2002;

Liaw et al. 2002). In addition to basic computer and keyboard skills, the use of online collaborative learning requires the recognition (and acceptance) that this approach is different from face-to-face group work. Hron & Friedrich (Hron et al. 2000) note that online collaborative learning has different characteristics compared with conventional face-to-face collaborative learning, especially the development of trust and information exchange, since there is the challenge of developing and sustaining a social environment in a medium that only uses text as a method of communication. Structured activities are helpful and this has also been noted in other studies (Marshall et al. 2001; Curran et al. 2003). However, the use of a discussion board was noted by members in two studies to be difficult and tedious to use (Curran et al. 2000).

Etzioni and Etzioni (1999) state that these differences may be due to the lack of available technology that can facilitate online collaborative learning. The development of 'blogs' and 'wikis' as a method for learning is being increasingly recognized since it can engage individuals in collaborative activity and knowledge sharing. Willams and Jacobs (2004) state that in 2003 there were over one million users of these methods and they ascribe the popularity to the high degree of interactivity that is directly under the control of the user, and learner. Oravecs (2002) notes that blogs can promote collaborative learning with sharing of knowledge resources and engagement in discussion. This is attributed to empowerment of the learner and the more conversational style of interactivity compared with a discussion board. These aspects appear to be interrelated since participants who use a discussion board may feel inhibited by the formal structure, as well as a computer-based interface that is not as user friendly.

- c. Implementation based on the recognition of the importance of the organization within which healthcare professionals work and learn

The cross-case analysis identified the importance of the organization within which the healthcare professionals are working and learning. Organizations will shape how individuals within the organization will behave (Harrison & Shirom 1999). Although there may be expressed intention that there is organizational support for online collaborative learning for healthcare continuing professional education (derived from external policy directives) it is often not experienced as such by healthcare workers who appear to perceive that there is no support, commenting on lack of recognition of the need for protected time. In addition, there appears to be a lack of investment in computer-based technology, including adequate arrangements for access and training in its use.

Possible limitations

It is important to consider possible limitations of the results obtained from the case studies. An important consideration is the extent to which participants have given information that represents their true perceptions and actions, and the extent to which the qualitative methods have faithfully captured the phenomenon. These factors are interrelated.

It is important that the qualitative research approach is of high quality but the notions of validity and reliability have been rejected as being inappropriate to qualitative research (Goodwin & Goodwin 1984). However, alternatives that appear to be more appropriate to the qualitative paradigm have been proposed (Cohen et al. 2000).

a. Validity

This notion is concerned with the extent to which the data corresponds to the 'truth'. However, the alternative interpretive paradigm considers that there can be no ultimate benchmark for judging a claim to validity since a competing variety of 'realities' that people are experiencing may be in existence (Denzin & Lincoln 1998). The alternative notion is 'credibility', in which the findings of the research are regarded as reflecting the world as experienced by the individuals who provided the data.

Validity of the data collection. Participants may be subject to 'reactivity', in which their thoughts and actions may be different because they are under scrutiny or placed in a new situation (Cohen et al. 2000). This relates to the data collected from self-disclosed comments on the discussion boards. This can be minimized by avoiding coercion of the participants, ensuring any research method is as unobtrusive as possible and that the intervention is as 'natural' as possible to ensure that it is not significantly different from what could be experienced outside the context of a research study. The telephone interviews rely on recall of perceptions before joining the discussion board. This may be subjected to hindsight bias, in which past experience may be presented with a different emphasis (Fischhoff 1977). The effect of these factors is unknown but we attempted to reduce the possibility of undue influence by adopting several strategies. Mann and Stewart (2000) recommend that the qualitative researcher should be open about the research, provide repeated opportunities for contact so that trust can develop between the researcher and the participant, and pay attention to his/her interaction skills (whether verbal or by online text). Both myself and ML were aware of these factors and we tried to ensure that these were respected throughout the research.

Validity of the data analysis. This also includes the cross-case analysis and is dependent on faithfully representing the underlying phenomenon. The main approaches are multiple coding, respondent validation and triangulation (Cohen et al. 2000).

- *Multiple coding:* This approach attempts to reduce subjectivity by introducing independent validation of the data analysis and its subsequent interpretation. This was performed in this study by myself and the research associate (ML) independently coding the data and developing themes. The independently produced lists were then discussed and a consensus was developed.
- *Respondent validation:* Respondent validation provides an opportunity for the individual from whom data has been collected to comment on the 'accuracy' of these data. Myself and the research associate (ML) identified the main points of the transcript, discussing any differences until consensus

was reached. The main points were then distributed by email to each interviewee for respondent validation. This was not regarded as being feasible for other data, such as analysis of the discussion threads in the discussion boards.

- *Triangulation:* Triangulation can be defined as 'the use of two or more methods of data collection in the study of some aspect of human behaviour' (Cohen et al. 2000). The logic is that multiple data sources increase the validity of the conclusions and this method has been widely accepted as ensuring validity (Cassell & Symon 1994; Bogdan & Biklen 1998; Denzin & Lincoln 1998; Cohen et al. 2000; Patton 2001). This study triangulated qualitative data for the cross-case analysis from both the telephone interviews and the discussion boards. Similar results were obtained from both of these different data sources.

b. Reliability

Within a positivist paradigm, there is the notion that an unchanging reality exists but this has been rejected by Lincoln and Guba (1985). As an alternative, they propose the notion of 'dependability'. This recognizes that the phenomenon under study is constantly changing but that the research design itself can also be a cause of this change. They suggest that the researcher needs constantly to be aware of how he/she may influence the phenomenon and its interpretation. We tried to have an open mind to our interpretations of the data.

c. Generalizability

Yin (2003) notes that 'a fatal flaw in doing case studies is to conceive of statistical generalization as the method of generalizing the results of the case study'. An alternative notion is 'transferability', which recognizes that direct comparison between settings may be inappropriate but some similarities may exist, which have the potential to promote further understanding in different contexts (Patton 1990). Patton (1990) recommends several approaches to develop transferability: first, by clearly describing the various different contexts within which the research has been performed and second, by the identification of similar themes across several case studies. In this study, the different contexts of the case studies are described in depth to allow readers to judge the extent to which they can be applied to their own situation.

The extent to which the findings from an individual case study can be applied to similar contexts is strengthened by the identification of similar themes in several case studies that have been undertaken in different contexts (Yin 2003). The case studies in this research were from different contexts but similar themes were identified in the cross-case analysis. However, Denzin and Lincoln (1998) and Patton (1990) suggest that the responsibility for deciding as to the transferability of the findings lies with the reader of the research.

Conclusion

There are a variety of factors that influence active participation, and learning, in online collaborative learning for healthcare continuing professional development. Although research has been performed in higher education, there are important

aspects that are related to the healthcare context of continuing professional development. This study and other published studies have highlighted the overall low level of activity and this would appear to be because implementation has not been based on an understanding of the phenomenon. The hype and hope of providing online discussion boards to develop active online learning communities will only become a reality when the key factors are considered and used to develop and implement online approaches for healthcare continuing professional development.

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