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Abstract

Background: E-mentoring had the potential to improve medical training, patient services, could be cost-effective, and support continued professional development. Research in terms of required core-competences for its effective utilisation in medical education seemed to be inconsistent, fragmented with significant variations in methodological rigor.

Aim: The primary aim was to review and synthesise existing evidence in educational science that addressed the question: "what are the required core-competences in e-mentoring for medical educators?"

Methods: A systematic literature search covered 25 literature databases and employed 42 single search terms and concepts and their Boolean combinations. Coverage was improved by Internet searches, further focus on "Grey literature" and the manual searching of library journals and inspecting the bibliographies of the references obtained by these methods.

Results: A total of 4344 citations from the literature search were identified. Altogether 44 items were finally selected for inclusion in the study. The extant quality of published research was generally weak. The weight of the best available evidence suggested that seven specific e-mentoring core-competence domains were seen as significant.

Conclusions: E-mentoring seemed educationally effective and complemented face-to-face mentoring for continuous professional development. Research in this field needs improvement in terms of rigor and quality.

Introduction

E-mentoring has the potential to improve medical training, patient services, can be cost-effective and support continued professional development (Bamford et al. 2008; Loureiro-Koechlin & Allan 2009; Overeem et al. 2009). This study describes the findings from a systematic literature-based review that explored an existing understanding of e-mentoring core-competences relevant to modern health care practice and medical education. There had been no prior attempt to synthesise existing findings and opinions on core-competence skills for online mentoring in medical education, though a considerable body of literature dealt with the issues of mentoring, e-learning and competence (Tesone & Gibson 2001; Allen et al. 2004; Mueller 2004). Many descriptions of e-mentoring skills existed but it seemed difficult to identify a comprehensive concept of required competences in a way that practitioners can make use of in their daily working lives. Existing research appeared to be inconsistent, fragmented with significant variations in methodological rigour (Sambunjak et al. 2006). This article identified seven distinct competence domains of e-mentoring, together with its advantages and disadvantages. It concluded that e-mentoring seemed educationally effective and complemented face-to-face mentoring for continuous professional development as a process that involved learning from a more experienced practitioner to enable career development and progression in the workplace.

Practice points

- E-mentoring was seen as a valuable approach to enhance standards of patient care by finding innovative ways of supporting medical staff in their efforts of professional development.
- The ability to facilitate the analysis, construction and confirmation of meaning and understanding within a community of online mentees through sustained discourse largely supported by text-based communication seemed to enhance reflective practice.
- E-mentoring requires considerable online facilitation competences and field expertise to be accepted by learners and improve professional outcomes.
- Online synchronous and asynchronous communication competencies were important in order to develop an appropriate writing style as the online process of communication had a greater likelihood of miscommunication due to its mainly non-verbal and non-visual character.
- Participants' experience of online time management was one of the most important factors in determining their rate of participation and completion of online-based tasks. The introduction of carefully structured and paced online assignments was important to reduce the amount of e-mentor and e-mentee time.

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Terminology

A variety of terminological phrases for e-mentoring occurred in the literature, for example, virtual mentoring, e-tutoring, cybermentoring, online mentoring, e-coaching and e-moderating. The term mentor denoted a broad scope of activities from being a role model, giving personal counsel, facilitating professional development to that of a teacher, supervisor and sponsor of a less experienced learner (Johnson 2002; Fisher & Webb 2008). E-mentoring was described by Bierema and Merriam (2002) as a computer-mediated, mutually beneficial relationship between a mentor and a mentee, which provided learning, advising, encouraging, promoting and modelling. That mode of rapport was often boundaryless, egalitarian and qualitatively different from face-to-face mentoring (Mueller 2004). This description had two elements that distinguished it from the traditional mentoring – the boundaryless configuration and the egalitarian quality of the exchange (Griffiths & Miller 2005). Boundaryless usually meant its relative independence of time and geographical distance. Egalitarian by and large denoted an open, class-free, i.e. less hierarchical mode of communication. At times, the term e-mentor or e-mentoring was used synonymously with e-moderator (Higgins & Kram 2001). E-moderating was indicated as a central concept (Bonk et al. 2004; Ally & Fahy 2005) to e-mentoring and commonly associated with computer-mediated communication (CMC). The term 'e-moderator' used by those who wrote about this role (e.g. Salmon 2004; De Smet et al. 2008) showed that it was not entirely a mentoring role, but aspects of the role like acculturation, building confidence and modelling effective behaviour overlapped with conventional definitions of mentoring.

Context of e-mentoring

Mentoring was widely acknowledged as being crucial for helping learners increase in knowledge, skills and professional confidence (Doherty & Hanmer 2005). Meta-analytic research confirmed that mentees had superior career outcomes, such as greater compensation and more promotions, compared to non-mentees (Allen et al. 2004). Mentoring was associated with more positive employee attitudes such as career satisfaction, job satisfaction, organisational commitment and lower turnover (Ragins et al. 2000; Wanberg et al. 2003; Payne & Huffman 2005). E-mentoring and mentoring programmes were introduced as part of organisational development schemes to support the medical workforce in the National Health Service (NHS; Smail et al. 2000; DOH 2004) over the past 10 years. There seemed to be a general consensus that mentoring to assist busy staff, especially during organisational- or training restructuring phases was a key development requirement (Freeman 1998; Garrett-Harris & Garvey 2005; Bamford et al. 2008). However, time, professional complexities and geography were major obstacles for face-to-face mentoring programmes. Staff tended to be too busy to take time out to travel for a mentoring engagement (Heidari et al. 2002). And potential mentors tended to be too busy with their own challenging agenda to commit time to mentoring. Time became a differentiating factor (Griffiths & Miller 2005). Added travel costs and geographical isolation increased the challenge. Introducing online mentoring offered a solution to these complexities, for example, health care professionals in Wales (Bamford et al. 2008). Besides, the literature highlighted a number of additional advantages and disadvantages of e-mentoring.

Advantages and disadvantages of e-mentoring

Some researchers (Hamilton & Scandura 2003) argued that online mentoring had some unique advantages over traditional face-to-face mentoring. For example, an online mentoring format allowed trainees to have mentors who were geographically distant from them, giving them access to professional expertise and assistance that might not otherwise have been available in their given practice environment (Knapczyk et al. 2005). Mentees and mentors could interact more frequently and at more convenient times online instead of trying to fit meetings into busy work schedules (Ensher et al. 2003). E-mentoring facilitated both synchronous (same-time) and asynchronous or delayed communication. The asynchronous aspects of online mentoring could subsequently facilitate a more reflective, task-oriented interaction than face-to-face discussion by allowing more time to reflect rather than to respond immediately (Mueller 2004). Moreover, e-mentoring offered for some greater privacy and anonymity than face-to-face communication, so mentees were more apt to address sensitive and personal concerns (Knouse 2001).

Other authors (e.g. Eby et al. 2000) debated potential disadvantages of e-mentoring, for example including a lack of face-to-face time (Westminster Forum of Education 2006), a lack of impromptu meetings, a lack of direct observation and technical problems with email or telephone as a means of communication (Luckhaupt et al. 2005). While studies on e-mentoring focussed primarily on whether mentees benefited from having a mentor, some claimed that there was little evidence on whether mentors themselves gained professionally from supporting a mentee (Lopez-Real & Kwan 2005). Luckhaupt et al. (2005) asserted that the majority of mentors who had experience with virtual mentoring felt that the long-distance relationship had not been as effective for mentees as onsite mentoring.

Competences of the online mentor

An attempt was made to identify specialist online mentoring competences to result in a comprehensive set of core-skills, which could inform standards of acceptable performance and provide respective training for medical educators. Hence, the research question: 'What are the required core-competences in e-mentoring for medical educators?' The fact was that many medical educators had never engaged in online mentoring and wondered what competences were required to distinguish this role from a traditional setting (Smith et al. 2002). A growing body of empirical studies had been published considering the task and role of the online mentor or moderator in the context of e-learning (Bonk et al. 2004; Rickard 2004), but a set of core-competences applicable to medical educators had not been identified. Consequently, I wanted to consider the required

specialist online mentoring competences for medical educators and a method that would bring the desired results.

Methods

A systematic literature review based on the Campbell Collaboration (2000) guidelines was seen as a suitable methodology to explore an analytical concept that explained the key issues in e-mentoring core-competences for medical educators. The flowcharts (Figures 1–3) give an overview as a way of introducing the methodological process. Its three distinct search phases with their research questions, related searches, search foci and outcomes are described.

The systematic search covered 25 literature databases (Table 1) and employed 42 single search terms and concepts (Table 2) and their Boolean combinations. The coverage was improved using Google Internet searches, further focus on 'Grey literature' and the manual searching of library journals (Table 3) and inspecting the bibliographies of the references obtained by these methods. The objective was to perform the most rigorous literature review possible of peer-examined

1st Phase	Process description
Initial research question	What is the role of e-mentoring in medical education?
Related searches	Start of literature review with searches 1 and 2
Search focus	Keywords were initially kept broad to maximise sensitivity
Outcomes	- design of the first two concept maps - Thesaurus of key words (see Table 2) - Refining of initial research question

2nd Phase	Process description
Refined research question	What are the e-mentoring competences required for medical educators?
Related searches	searches 3, 4 and 5
Search focus	high sensitivity of keywords combined with high review specificity of generated material
Outcomes	concept map on generic professional-, generic mentoring-, and specific e-mentoring competences

3rd Phase	Process description
Research question	What are the e-mentoring competences required for medical educators?
Related searches	searches 6 to 25 and individual journal searches
Search focus	high keyword specificity to maximise identification of primary studies
Outcomes	e-mentoring competences model for medical educators (see Figure 6)

Figure 1. Flowchart of the methodological process.

published and unpublished material judged for its academic quality.

Inclusion and exclusion criteria

For the first and second search phases, I included all studies addressing e-mentoring competences in medical education, nursing, business, law and administration, and included all qualitative studies. Materials published in peer review journals or those from universities were selected. I also considered studies evaluating the impact of role models, who were defined as persons who serve as a model in a particular behavioural or social role for another person to emulate (Fleming et al. 2005). Peer e-mentoring was included, although it involved a more equal experience level in the mentoring relationship (Le Cornu 2005). Published and unpublished articles, dissertations, government reports, conference proceedings and technical reports were considered for inclusion.

Studies on mentoring were excluded if (a) they lacked a cohesive and common definition of mentoring, or (b) if they lacked solid experimental designs evaluating the effectiveness of mentoring as suggested by Merriam (1983). As the focus of this analysis was on adults in training or participating in the medical workforce, studies that evaluated teen e-mentoring were excluded. Articles related to the use of training simulators, computer-based testing, clinical decision support systems and telemedicine were excluded if they could not demonstrate a clear educational focus.

In response to the large volume of potentially relevant studies generated by search phases one, two and three of the literature-based review, I refined the final criteria for any individual piece of literature to be used in this review as: It should discuss the generic- or specific e-mentoring competences required for all medical educators, and should specifically consider the components of competence necessary to fulfil the role of an e-mentor for medical education.

Data extraction, coding and synthesis

Data were extracted systematically using a standardised data extraction protocol. A data extraction sheet was designed (Table 4), which had to serve several important functions (Meade & Richardson 1997). First, the form needs to be linked directly to the review question and criteria for assessing eligibility of studies, and was provided a clear summary of these that was to be applied to identify study reports. Second, the data collection form was used as the historical record of the multitude of decisions (and changes to decisions) that occurred throughout the review process. Third, the form was the source of data for inclusion in my analysis.

Primary reports (Figure 4) were then grouped and a system of coding emerging themes was performed (Figure 5). Relationships between the reports and within the groups were sought, translating metaphors and synthesising refined themes (Jensen & Allen 1996). Findings made on each of the studies relating to e-mentoring competences (e.g. online cognitive competence domain) were combined and sorted into topics. This was done with all 44 reports regarding the
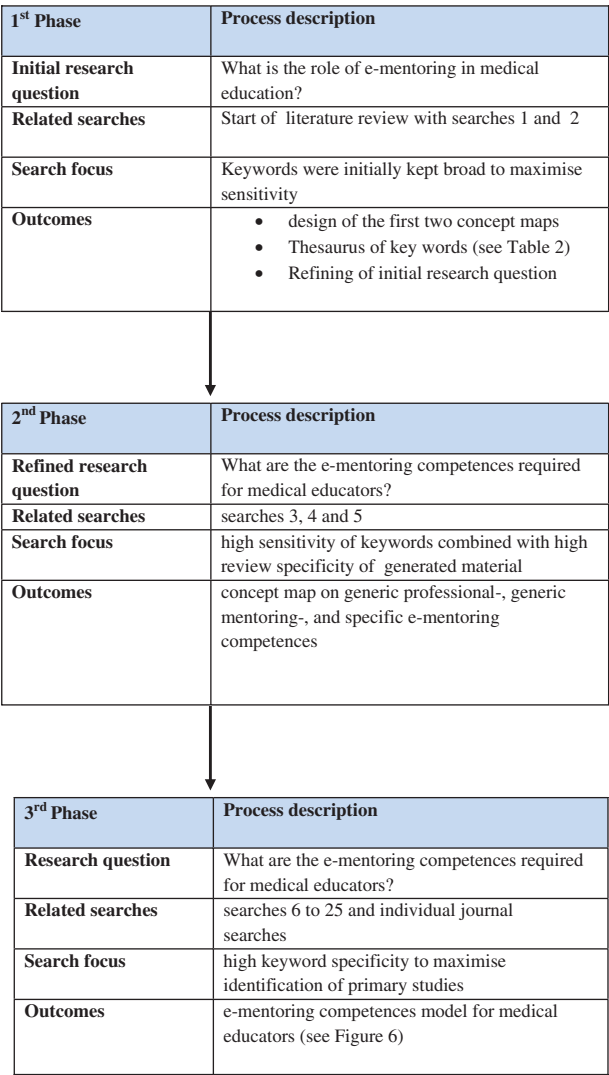
seven competence domains as discussed in the 'Results' section. Initially, there was a pool of a multitude of small items of information that represented the total of all addressed e-mentoring competences. This was the first stage of coding. These items were then copied into groups that seemed to be reporting a common theme. Themes were coded together when they seemed to express the same component of competence, for example, 'facilitating students' online discourse' (Garrison & Anderson 2003) was considered to belong to a similar competence as 'engaging students in online discussions' (McVay Lynch 2002). This was the second stage of coding. Most of these themes of individual components of e-mentoring competencies fulfilling the inclusion criteria reported the opinions and observations of individuals or groups of authors. Therefore, they were analysed as though they were transcripts of interviews using a qualitative meta-synthesis approach as described in the next paragraph.

Selection bias was reduced by collecting data using systematic methods in common with those applied for a quantitative review (Counsell 1997). But the analysis and synthesis of this qualitative data was markedly different from the methods employed for quantitative information (Williams et al. 2001). As this review attempted to interpret and assimilate the viewpoints of different medical educators, the medical profession as a whole and other professionals to gain a broader understanding of e-mentoring competences, I elected to utilise an emerging method for synthesising interpretive research called meta-synthesis (Jensen & Allen 1996; Pope et al. 2007). Meta-synthesis aims to further understanding by using the results, for example, for the development of a new concept (Sherwood 1999), as it was the case in this review. This afforded a research procedure that could be recorded, checked and aided to reduce bias. In this way, the body of accumulated knowledge on e-mentoring was made more accessible and, thus, more useful both to practitioners who would seek to implement findings and to researchers who would intend to extend the knowledge base (Polit & Beck 2003).

Results

In total, 4344 citations from the literature search were identified. The outcome of the selection process resulted in a retrieval of 320 full-text studies for assessment after reviewing abstracts. Altogether, 44 items were finally selected for inclusion in the study (Table 5). Recurring competence themes were sorted into subject areas. Four major competence domains emerged and were classified as:

(1) Generic professional competences
(2) Generic mentoring competences
(3) E-learning competences
(4) Specialist e-mentoring competences

The three generic competences – professional, mentoring and e-learning – were perceived as the foundational structure that supported the specialist e-mentoring domains.

The weight of the best available evidence suggested that seven specific e-mentoring core-competence domains were seen as significant. Though they overlapped to a degree with the foundational competences, they exhibited specific online attributes (Figure 6). These seven domains constituted the answer to the research question 'What are the e-mentoring competences required for medical educators?' The seven online domains pertaining to e-mentoring competence were:

(1) Online developmental competence domain
(2) Social
(3) Cognitive
(4) Teaching
(5) Communication
(6) Managerial
(7) Online technical competence domain

Discussion

E-mentoring involved dealing competently with the management of the interface between people, their learning and developmental process, and the supporting technology (Warner & Witzel 2004). I elected to start with a discussion on the online developmental competence domain because it provided a conceptual notion to which all other domains referred.

Online developmental domain

Online developmental mentoring competences consisted for Sandars (2006) and Mash et al. (2005) in ongoing support and encouragement to help the learner through an online phase of training, responding to emerging needs of learners,

Type of item	No.	References
Books	8	Allan (2007), Foster-Turner (2006), Garrison and Anderson (2003), Littlejohn and Pegler (2007), McVay Lynch (2002), Salmon (2002b), Salmon (2004) and Sandars (2006)
Literature reviews	9	Barker (2002), Bierema and Merriam (2002), Brace-Govan (2003), Ensher et al. (2003), Godshalk (2007), O'Neill and Harris (2005), Ramani et al. (2006), Sambunjak et al. (2006) and Taherian and Shekarchian (2008)
Case studies	19	Bamford et al. (2008), Carbonaro et al. (2008), Connolly et al. (2007), De Smet et al. (2008), Easton (2003), Freeman (1997), Heidari et al. (2002), Hew and Knapczuk (2007), Hlapanis et al. (2006), Hunt et al. (2003), Kasprisina et al. (2008), Mash et al. (2005), Motteram (2006), Moule (2007), Murphy et al. (2005), Packham et al. (2006), Ryan et al. (2004), Salmon (2002a) and Wang (2008)
Discussion papers	6	Headlam-Wells and Gosland (2007), Gordon (2000), Griffiths and Miller (2005), Gunga and Ricketts (2008), McKimm et al. (2003) and Mueller (2004)
Expert consensus	2	Berk et al. (2005) and Department of Health (2004)

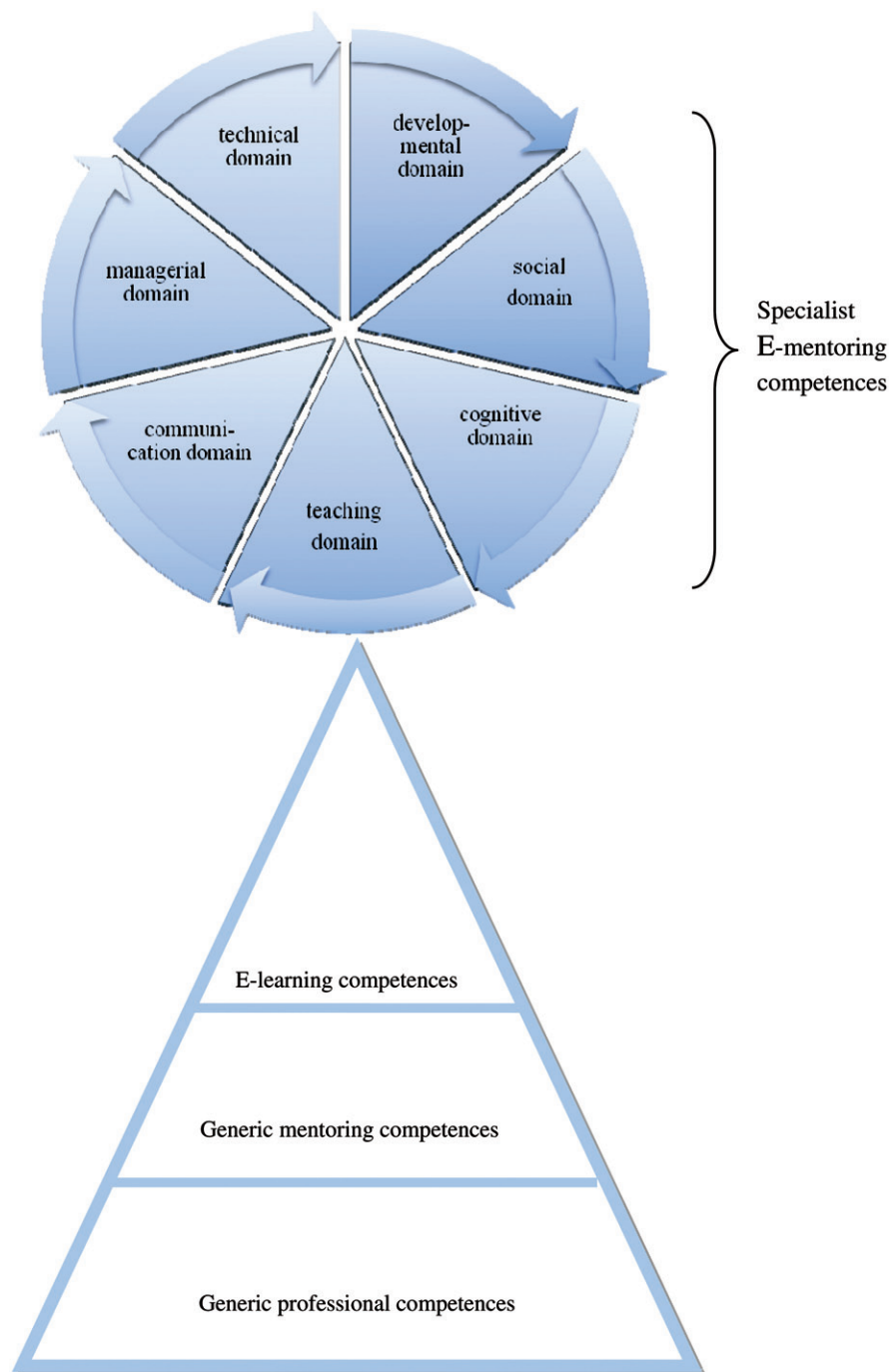Table 5. Overview of included studies.

Figure 6. E-mentoring competence model.

recognising learners success, counselling in case of difficulties and initiating activities that would help learners to progress towards their own goals and course objectives. Thornett and Davey (2006) maintained that being learner-centred was even more important in an online relationship due to a lack of face-to-face contact. Other authors ascertained the key ingredients of the developmental mentoring approach as consisting in facilitating personal support (Freeman 1997), encouraging mentees ideas and work (Berk et al. 2005), and being a guide on the side and counsellor (Ellaway & Masters 2008; Gunga & Ricketts 2008).

The reviewed literature on the online developmental competences in e-mentoring highlighted one key element in

particular: the ability to facilitate online learning and placed that activity in a developmental professional relationship. Therefore, e-mentoring was considered by Bierema and Merriam (2002) and Hall and Khan (2003) as an extremely effective means of supporting professionals in their various cycles of life-long learning. As a result, they found that professionals were being better equipped, for example, to deal with a continuously changing and uncertain organisational environment.

Part of a mentee-centred developmental approach was also reflected in the ability to evaluate the mentee's beliefs, values and preferred learning styles in order to enhance the online mentoring process (Foster-Turner 2006). Tesone and Gibson

(2001) found that mentees benefited from the online relationship through a noticeable accelerated learning curve. Heidari et al.'s (2005) study stated that the needs of the mentees were intense in the first few days and continued to need support for the first 3–6 months of a new professional training phase. Therefore, the authors submitted that their mentoring scheme was at its most effective in that initial period for newly qualified staff.

Online social competence domain

Garrison et al. (2000) alluded to the online social competence domain as the ability of mentors in an online community to project themselves socially and emotionally, as real people (i.e. their full personality), through the medium of communication being used. It did involve the expression of emotions, risk-free expression of communication and encouraging group cohesion through collaboration (Garrison & Anderson 2003).

De Smet et al.'s (2008) study reported that tutors' ability of online social support seemed to be of continuous importance. Remarkably, the incidence of contributions focussing on socialisation increased over time, while a declining trend could be seen in contributions stimulating knowledge construction. Moreover, social and emotional competence was found to be of continuous importance to foster cognitive processing. Tutors and tutees did not see and know each other while interacting online. As a consequence, the skill of building a sense of community was a prerequisite in the text-based learning environment. Salmon's (2004) model of e-moderation was consistent with that finding, indicating that social and planning behaviour was of central importance to foster knowledge construction and reflective thinking in an online setting. This highlighted the fact that a communicative approach within online forums always remained both task-centred and personal. Brace-Govan (2003) related to the above-mentioned notion, when asserting that an e-mentor needed to establish an appropriate learning atmosphere and encourage students to develop rapport and trust with only limited cues.

The potentially impaired development of an online relationship because of the lack of visual and auditory physical cues was pointed out in Ensher et al.'s study (2003). Therefore, Packham et al. (2006) reasoned that an online mentor would need to be able to develop an engaging online persona as a critical component to successful e-moderation. Social domain e-mentoring competencies also included knowing how to sustain a useful online learning community (Salmon 2004) by establishing a culture for productive interaction (Easton 2003) through collaborative sharing of professional knowledge (Sandars 2006), developing team-based collaborative skills (Cabonaro et al. 2008) and designing innovative, social online activities (Murphy et al. 2005) that promoted group cohesiveness. Similarly, McVay Lynch's (2002) investigation indicated that fostering a sense of community, for example by expressing feelings in anything written like excitement for the course beginning was a valid skill to develop.

Headlam-Wells and Gosland's (2007) case study illustrated the importance of combining principles of social interaction with those of human–computer interaction to create and maintain an effective online mentoring community. They argued that it was highly desirable for the mentor pair to meet before beginning their online relationship. As an evidence of this, 89% of the participants considered their initial meeting vital for establishing rapport. Ideally, this should be face-to-face, but video-conferencing, or the use of webcams, would have been an acceptable substitute. In this way, technology enabled relationships to occur across organisations and across countries that would not have been possible previously. Their research pointed out that a blended approach, where e-mail and telephone contact were included, was the most widely used. Their experience further indicated that in designing successful e-mentoring schemes, developers needed to create a community in cyberspace, not just an unrelated set of mentor pairs. With this in mind, photographs were taken of participants at the initial briefing seminars and uploaded to a website, so that they could have their partner's face in view as they talked online and to help them develop their online identity when participating in group discussions. In terms of communication during the e-mentoring period, the majority of mentors (67%) and mentees (81%) indicated that their approach was blended, using two or more different methods.

Bamford et al.'s (2008) e-mentoring research findings further illustrated this importance of establishing rapport in an online mentoring engagement. Where rapport existed then the requirement for ongoing face-to-face mentoring diminished, allowing the emergence of e-interfaces. This was evidenced by the number of e-engagements in their mentoring trial. Visual engagement through webcams, videoconferencing, Skype and mobile phone camera were considered a viable alternative with the added benefit of saving on time and travel. The majority of their mentees made use of a blended approach through personal digital assistants (PDAs), laptops and face-to-face meetings. Of the mentors, 50% had more than four engagements within 6 months; significantly, more than traditional mentoring of one or two within the same time period. Of the respondents, 90% would recommend a blended e-mentoring approach to a colleague.

While strong developmental and social competences provided the basis for respectful relations and critique, it did not guarantee an optimal functioning of the online mentoring and learning process (Garrison & Anderson 2003). There had to be additional areas to establish these competences in a balanced setting for the specific educational goal.

Online cognitive competence domain

The concept of the online cognitive competence domain described the intellectual environment that supported sustained critical discourse and higher-order knowledge acquisition and application (Garrison & Anderson 2003). In other words, it addressed facilitating the analysis, construction, and confirmation of meaning and understanding within a community of mentees or learners through sustained discourse and reflection largely supported by text-based communication.

One of the strongest themes in the cognitive competence domain for Collins et al. (1989) and many other authors (Ryan et al. 2000; Salmon 2004; Mash et al. 2005; Murphy et al. 2005; Hew & Knapczyk 2007) was maximising the personal potential

of a mentee through achieving change by the medium of a reflective practice, resulting in changed perspectives and a re-ordering of priorities. Salmon (2002b) championed opportunities for reflection saying that they needed to be built into the design of every online conference and facilitated by a trained e-moderator. Further skills included modelling, coaching and scaffolding which were based on Collins et al.'s (1989) cognitive apprenticeship model. These competencies were designed to help learners acquire an integrated set of cognitive and meta-cognitive skills through processes of observation, and guided and supported practice. Modelling, coaching and scaffolding were but some of the terms used to describe the roles and competencies related to enhance reflection.

Murphy et al.'s (2005) study explored how to provide a related reflective framework by helping students to become online facilitators of learning rather than remaining in a passive learning role. Their model fostered active learning by turning students into discussion facilitators who elicited participants' higher-order thinking and engagement with the content in an authentic context. Reflecting Anderson et al.'s (2001) description of discourse facilitation, the discussion facilitators had to identify areas of agreement and disagreement; sought to reach consensus and understanding; encouraged, acknowledged or reinforced student contributions; set a climate for learning; drew in participants comments, prompting discussion; and assessed the efficacy of the process. They found that students became experts in the content that they facilitated (Murphy et al. 2005) while learning to emulate the supervising instructor's facilitating approaches. Interestingly, they discovered that many students who had already been facilitators earlier in the semester adopted facilitating roles when they were participants in later discussions.

The above-mentioned study concurred with one of Brace-Govan's (2003) findings that showed how carefully designed questions were the most important elements for keeping students online and on topic and providing students with guidelines on how to prepare responses was a close second. Providing constructive, timely, clear and comprehensive feedback to mentee's questions and work (Berk et al. 2005; Griffiths & Miller 2005; Packham et al. 2006) was highlighted as another important cognitive competency for mentors.

In summary so far, developmental, social and cognitive competences were important e-mentoring components independent of time and space with the combination of interactive and reflective characteristics that seemed to stimulate and facilitate higher-order learning.

Online teaching competence domain

The role of teaching in e-mentoring was more about providing information and working with the mentee to facilitate reflection and integrate learning to their personal and professional lives rather than formal, didactic online teaching (Ramani et al. 2006). In terms of expertise, Berk et al. (2005) emphasised the mentor's greater experience, influence and achievement within a particular organisation as a key competence for the achievement of any e-mentoring programme. Allan (2007) and Heidari et al. (2002) supported that view by saying that an online facilitator should be an expert rather than a novice in their field

in order to be accepted by learners. Within this capacity, Hlapanis et al. (2006) identified two distinct styles of how e-mentoring was conducted: (1) a low or non-directive moderation style, when mentors intervened with mentees in order to help them 'reflect' while progressing their discussions; and (2) a high or more directive moderation style, when mentors intervened in both the processes of the online course and the content. E-mentors had to be competent in ascertaining of how much of their involvement in the mentoring process was desired by the mentee (Horvath et al. 2008). Although Allen and O'Brien's research (2006) showed that the presence of a formal mentor or mentoring programme increased organisational attraction, some researchers (Wanberg et al. 2003) asserted that requiring participation in such a programme could be perceived as coercive, leading to resistance to the otherwise beneficial aspects of the mentor–protégé relationship. Hence, giving participants the choice to attend formal mentoring programmes seemed to result in greater training motivation and satisfaction (Mathieu et al. 1992).

E-mentoring skills identified have included group leadership and critically reflective teaching as key facilitator roles in adult learning (Collison et al. 2000). The online medium also required reaching out to learners in ways beyond what would be necessary in a traditional environment, for example by contacting and motivating inactive online learners (Allan 2007; Hew & Knapczyk 2007).

Like face-to-face mentors, competent e-mentors of both genders had to be vigilant to cross-gender dynamics and concerns. For example, Gilbert and Rossman (1992) recommended that, when men mentored women, they had to be particularly careful to empower, sponsor and help women protégés create new self-visions and identities in the professional world. In addition, gender mentoring also required honest awareness of sexual attraction and careful avoidance of sexual intimacy (Johnson 2002). This was also relevant for blended mentoring (Motteram 2006; Carbonaro et al. 2008), i.e. the combination of face-to-face and online mentoring, which was regarded as an essential skill. If the right balance between online and face-to-face interaction was given, mentees knowledge and skill development seemed to be enhanced in comparison to a single mentoring method (Jakubik et al. 2004).

Online communication competence domain

Salmon (2004) defined online communication skills as the ability to engage with people online (not the machine or the software). This involved considering time lags between logging on and taking part, and waiting for replies.

Barker (2002) stressed the necessity to be familiar with 'netiquette', which was often used to describe the collection of skills, knowledge and expertise needed to conduct effective and socially acceptable online conversations (Zimmer & Alexander 1996). Authors like Ensher et al. (2003), Foster-Turner (2006), and Headlam-Wells and Gosland (2007) agreed that training should be offered in online communication competencies in order to develop an appropriate online writing style, because the online process of communication had potential risks due to its mainly non-verbal and non-visual character, creating a greater likelihood of miscommunication.

Sandars et al. (2006) identified numerous related skills, for example to write clearly and unambiguously, and to write concisely as being too verbose would consume too much time in routine online conversations. Besides, Easton (2003) argued that online instructors needed to succeed in eliciting positive responses from students by consciously writing their content in a way that ensures immediacy and conversational tone.

In addition, the discussion about online communication competencies centred mainly on synchronous and asynchronous communication competencies. The analysis of Hlapanis et al.'s (2006) data showed that the most successful lessons, both according to trainers and trainees, were the ones that had a high degree of communication and interaction among the participants; and focussed on cooperation, negotiation and flexibility during their conduction. Synchronous communication was used in a higher degree in most successful lessons than in less successful ones. Synchronous communication proved to be very effective as a means of decision making, team building, learning and brainstorming (Hlapanis et al. 2006). In successful lessons, synchronous communication was also used to form a high degree of commitment, cooperation, interaction and flexibility. The above-mentioned findings slightly contrasted with Mueller's (2004) results about North American and East Asian college students. She found that participants in synchronous CMC did not seem to have as high a commitment as when they engaged in face-to-face communication and had lower levels of performance outcomes. Furthermore, some students believed that never meeting with their coach face-to-face allowed for a more honest and objective relationship (Harrington 1998).

Salmon (2002b) found that asynchronous discussion was a significant part of learners' experience of the online context and confirmed Steele's (1996) view that a key impact of CMC is on the ability to respond over elapsed time. A reflection-on-action record could be built up online. Participants' reflective processes were captured through analysis of their on-screen text messages and were available for research purposes. Asynchronous communication was, in Salmon's (2002b) view, essentially reflective and responsive communication. Cabonaro et al. (2008) confirmed these findings by stating that students usually reported positive responses to the use of asynchronous technology in the classroom. Moreover, Hew and Knapzcyk (2007) study offered evidence that asynchronous online mentoring and question prompts enhanced the professional development of both mentees and mentors by helping them learn about and apply intervention strategies in solving professional problems.

Online managerial competence domain

Online managerial competences addressed the process from an online organisational, procedural or administrative standpoint, including setting the agenda for the programme like the objectives of the discussion, the timetable, procedural rules and decision-making norms (Murphy et al. 2005).

Managing online time was one of the major skills identified to be a competent e-mentor by a number of authors (Hunt et al. 2003; Salmon 2004; Allan 2007). Participants' experience of online time management was one of the most important factors in determining their rate of participation and completion of Internet-based courses (Salmon 2004). Salmon (2004) indicated further that e-moderators had to give a clear indication of an expectation of active contribution and by pacing and structuring the online activity. It was therefore important to specify the amount of time and what was expected of e-moderators and participants to do and by when and not to leave this open-ended. Subsequently, Salmon (2002a) advised structured, paced and carefully constructed e-tivities to reduce the amount of e-moderator time. This also impacted directly on satisfactory learning outcomes adding value to the investment in learning technologies.

Hunt et al. (2003) and Allan (2007) found four distinct approaches to competently manage online time: (1) set clear boundaries around time online; (2) let learners know how often you are likely to be online; (3) ask learners to phone or to send private emails for urgent actions; and (4) set up a frequently asked question list.

Other managerial online competencies identified were as follows: registering new learners, arranging learners into groups, organising times for online group events (Sandars & Langlois 2006); maintaining students' records to facilitating self-directed learning, because in a virtual environment, monitoring student progress can be even more difficult than in the classroom (Easton 2003); making sure that online interactions progress respectfully and smoothly monitoring regularly online participation and inviting missing members to contribute (Griffiths & Miller 2005).

Online technical competence domain

The view of authors on how technically competent an e-mentor had to be ranged from not needing to be an expert but able to advise with the inevitable technical glitches (Allan 2007) to 'the technophobe tutor will simply never get their course up and running' (Murphy 2006). Godshalk (2007) tentatively located technical online competencies somewhere in-between the above positions by saying that previous experience with CMC use was necessary.

Murphy et al. (2005) found that online technical mentoring skills focussed on helping students learn to function and feel comfortable in the online environment, such as getting online and resolve technical problems with their hardware and software. They also emphasised skills in cross-functional teaming to provide a seamless integration for the student with the information technology (IT) department in case of technological difficulties. Technical support through a competent IT department was considered to be important as Bamford et al.'s (2008) study demonstrated a strong feedback regarding the volatility of the technology interface.

Ellaway and Masters (2008) alluded to being technically competent with virtual learning environments (VLEs) (e.g. Moodle, Blackboard) as a supply to a single unified environment for e-learning or e-mentoring, which generally included a wide range of integrated tools for content delivery, interaction and administration. Although some found VLEs confining, they met most teachers' and learners' needs in their opinion. In areas where VLEs failed to meet specific needs, these should

be met by implementing supplemental programmes and services. In addition, Murphy (2006) asserted that online mentors should be competent in the use of e-mail, bulletin boards and audio and videoconferencing with and between learners. Being technically competent was seen by Easton (2003) as not only important in order to resolve technical problems, but as a key component to enable learning. Berge and Collins' (1995) study mentioned the need of being competent in virtual management techniques, and the ability to engage students through virtual communication because of the lack of visual and auditory cues in the online environment.

Ensher et al.'s (2003) study accentuated the competent use of e-mail as a prerequisite for online mentoring. Their mentees found it was more convenient to communicate via e-mail rather than leaving their work site to meet in person. Likewise, Hunt et al.'s (2003) research reported that 60% of mentees and over 55% of mentors cited convenience, flexibility and ease as the major benefits of e-mail-based mentoring.

Research limitations

Many studies provided little detail on how the surveys were constructed or on the study sampling frame. The role of the online mentor and content of mentorship greatly differed among the studies, ranging from an informal personal support to formalised mentorship relations. Many studies did not mention if a mentor was assigned, trained or self-identified. Moreover, only a few studies commented on how frequently mentors and mentees met online or on the intensity of their interaction. There was little mention of potential adverse outcomes associated with online mentoring (Salmon 2004; Ramani et al. 2006) that identified, for example, increased online workload, inappropriate emotional intimacy and the dangers of online miscommunication. Most of the research was completed in North America, Europe and Australia, and may not accurately reflect situations in developing and other countries.

Various studies had only small numbers of participants. For example, Hew and Knapzcyk's (2007) data was derived from 26 participants (6 males and 20 females). Some studies did not attend to differences among the participants and mentors with regard to their knowledge level, teaching experience and culture of their work place. Another limitation was that they did not compare online mentoring to more conventional approaches for mentoring work experiences.

Berk et al. (2005) admitted that relating to their study, the most common indices of item analysis, validity and reliability computed from their sample data could not be estimated for most of their scales of mentors' effectiveness. Although a common set of criteria and scale items were administered using standardised procedures, typically each mentor–mentee relationship was unique. For example, the ratings by each mentee were usually based on different role profiles. Hence, the ratings were not comparable and did not have the same meaning.

Literature on the competences of mentorship in other fields, such as nursing and business, also showed lack of reliable evidence, indicating a general need for clarification of theoretical and conceptual perspectives in order to increase the

knowledge of online mentorship, particularly its traditional career and psychosocial functions. The view that emerged was that the current research fell short of a robust evaluation of the area, largely due to the lack of data (Hunt et al. 2003). As a result, there had been calls for e-mentoring to be seen as a supplement to, but not a substitute for face-to-face mentoring.

Further research

This literature-based review was successful in identifying core-competence skills on e-mentoring for medical educators. More study is needed to explore how to efficiently and meaningfully involve mentees and mentors in the e-mentoring process and integrate these skills in local and/or national educational strategies.

Based on the study findings further research should focus on:

(1) Analysis on training needs for e-mentoring and e-learning skills among medical educators.
(2) Action research into standard settings for e-mentoring and e-learning policies for medical education.
(3) Identification of core-elements of training programmes to increase e-mentoring and e-learning skills for medical educators at a local- or national level.
(4) Action research at local level focussing on the shift in pedagogy to further develop an understanding on the impact of technologies in learning.
(5) Exploration of ways that e-mentors can incorporate their e-mentoring. Programme and experience into their continuous professional development.
(6) More rigorous methods to determine the effectiveness of e-mentoring, addressing contextual issues and using cross-disciplinary approaches.
(7) Studies with larger sample sizes and a wider range of mentors that can help to better understand the impact of e-mentoring.

Recommendations

The review findings explored the specifics of e-mentoring competences, their advantages and disadvantages, and highlighted its potential for professional development in medical education. Further recommendations were suggested as supported by the research findings:

(1) E-mentoring and e-learning skills training should occur during medical training.
(2) E-mentoring should become part of the training of the health care professionals.
(3) Preferably collaborative development groups should be formed at local, regional and national level to design, initiate, execute and evaluate e-mentoring programmes.
(4) E-mentoring roles within virtual communities such as blogs, social networking sites or VLEs should become part of supporting health care professionals and medical educators especially during times of professional or organisational change.

Conclusions

The literature did not indicate a hierarchy of e-mentoring competences, denoting one as more significant than the other. Different authors addressed various e-mentoring competences according to their own merit, but did not indicate any individual prominence. It was felt that these domains had equal status in contributing to the online mentoring process. One can speculate why that may be the case. One possibility could be that research into e-mentoring was still relatively underdeveloped. Consequently, authors were cautious in making broad assumptions due to a lack of sufficient evidence. Research in this field needs improvement in terms of rigour and quality. E-mentoring seemed educationally effective and complemented face-to-face mentoring for continuous professional development. It may not only enhance and reinforce existing practices of efficient information dissemination, but much more importantly, e-mentoring may aid in the alteration of how we approach learning. Particularly, the asynchronous aspects of online mentoring appeared to facilitate a more reflective, task-oriented interaction than face-to-face discussion by allowing more time for reflection.

Acknowledgements

Notes on contributor

Dr Markus Schichtel is currently a GP appraiser at Oxfordshire PCT and Educational Supervisor of Oxford University medical students after the completion of a masters degree in Medical Education from Cardiff University. One of his special interests is the teaching and training of health care professionals by using innovative educational methods.

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Appendix

Table 1. Overview of selected databases in the literature search.

	Period
Database search phase 1	
All EBM reviews: ACP, COCH, DARE	Earliest to 2008
AMED	1985–2008
Books at Ovid	Earliest to 2008
BNIA	1985–2008
CINAHL	1982–2008
EMBASE	1980–2008
HMIC	Earliest to 2008
IBSS	1951–2008
Inspec	1969–2008
MEDLINE (R) and MEDLINE (R) in-process and other non-indexed citation	1950–2008
PsycINFO	1806–2008
Your journals @ Ovid	Earliest to 2008
Database search phases 2 and 3	
ASLIB	Earliest to 2008
ASSIA	1987–2008
BIDS	Earliest to 2008
BUBL	Earliest to 2008
COPAC	Entire record
ERIC	1962–2008
Google	2005–2008
HTA	Earliest to 2008
LTSN	Entire record
NRR	Entire record
SCOPUS	Entire record
SIGLE	Entire record
Web of science	Entire record
ZETOC	Earliest to 2008

Table 3. Individually searched journals.

Journal	Period
Academic Medicine	Earliest to 2008
British Journal for General Practice	Entire record
British Journal of Educational Technology	Earliest to 2008
British Medical Journal	Entire record
Primary Care Research	Entire record
Medical Education	Entire record
Medical Teacher	Earliest to 2008
Postgraduate Medical Journal	Earliest to 2008
The European Journal of General Practice	Entire record
Reference	Hew and Knapczyk (2007)

Table 2. Thesaurus of keywords on e-mentoring.

Alternatives to mentoring	Alternatives to electronic	Areas of interest	Professionals involved	Related activities
Mentor*	Virtual	Medic*	Mente*	E-tivit*
Supervis*	Cyber	Educat*	Protege*	E-system*
Tutor*	Online	Professional	Precept*	E-mentor*
Moderat*	Blended	Primary care	Graduate*	E-tut*
Coach*	Tele*	General pract*	Student*	E-supervis*
Tuit*	Supported	Academic*	Doctor*	E-moderat*
	Technic*	Learning		E-coach*
	Technol*	Compet*		
	Electronic*			
	CAL			
	CML			
	CMC			
	Computer-assisted			
	Computer-mediated			
	Computer-commun*			

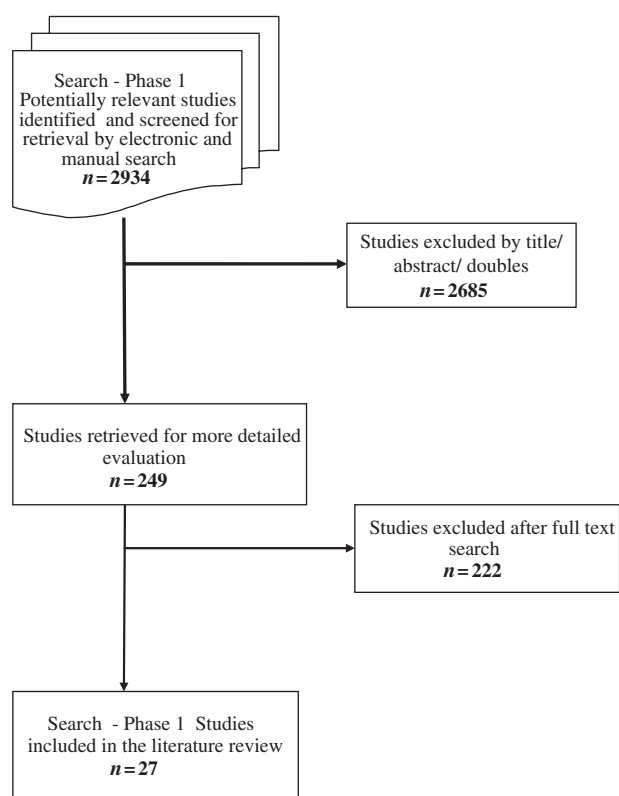| Table 4. Example of data extraction sheet findings.	
Subject/settings	• An exploratory study of question prompts and online mentoring (peer-mentoring experience) in a field-based practicum that focussed on teaching ill-structured problem solving of classroom discipline • Data on 26 (6 males, 20 females) in-service practicum teachers through online observations, online journal reports, questionnaires and reflection logs • A qualitative case study methodology was used • A 15-week graduate level practicum offered at a large Midwestern university in the United States • Each practicum teacher had one or two mentors and a faculty instructor who oversaw the teacher's work and interactions with mentors
Which e-mentoring competencies are addressed?	1. Valuing the practicum teachers' contributions: praise, thanks and empathy 2. Offering information about resources or sharing resources 3. Offering solutions or providing advice on solutions 4. Offering suggestions specific to the collection/reporting of data 5. Providing information on specific principles, concepts or theories 6. Giving advice about the problem context 7. Asking practicum teachers to clarify or elaborate 8. Sharing personal experiences or stories
What broader e-mentoring component governs above competencies?	Findings regarding mentoring functions reveal that mentors tended to use more instrumental-type psychosocial function or coaching through participation and providing structure, supporting individual students functions
Intended use and expected learning outcomes	Offering evidence on asynchronous online mentoring and question prompts
Study findings	• In-service practicum teachers perceived e-mentoring as being very beneficial in supporting their learning • About 24 practicum teachers (95%) were successful in developing effective interventions for their students • About 23 practicum teachers (92%) reported that the process outlined in the question prompts served as a very useful guide for addressing the longstanding problems of their student. In addition, 25 (98%) agreed or strongly agreed that interaction with the online mentors encouraged them to be more thoughtful with their project tasks • Survey results from item three and four indicated 22 mentors (85%) agreed or strongly agreed that being a mentor furthered their learning of concepts and procedures for handling classroom behaviour problems and 21 mentors (80%) agreed or strongly agreed that mentoring aided them in learning how intervention methods could be used with their own students
Critique points	• Small numbers; study population: 77% females • Study did not attend to differences among the practicum teachers and mentors with regard to their knowledge level, teaching experience and culture of their work place • Another limitation is that they did not compare online mentoring to more conventional approaches for supervising field experiences. With the increasing use of online technology in teacher education, it would be beneficial to compare conventional and online models of supervision to determine which approach enhances key aspects of professional development • It would be useful to study whether adding one or two face-to-face meetings between practicum teachers and mentors or structuring onsite visits of mentors to the teachers' classrooms would have been helpful
Other important points	• The study offers evidence that asynchronous online mentoring and question prompts can enhance the professional development of both practicum teachers and mentors by helping them learn about and apply intervention strategies in solving real-world teaching problems • That online mentoring can pose some challenges as well. Its effectiveness seems to depend on having mentors who provide consistent, task-oriented and timely feedback
Qualifies as	Primary study **X** Background information

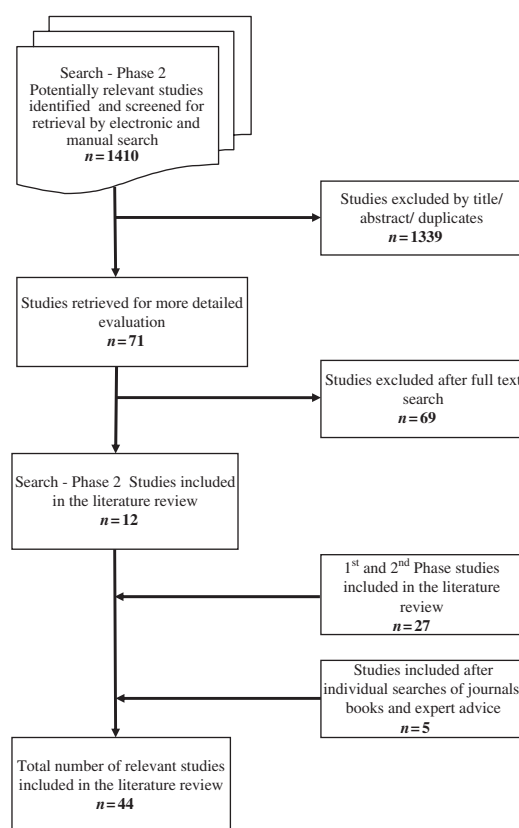**Figure 2.** Flowchart of 1st and 2nd phase selection process.

Figure 3. Flowchart of 3rd and final selection process.
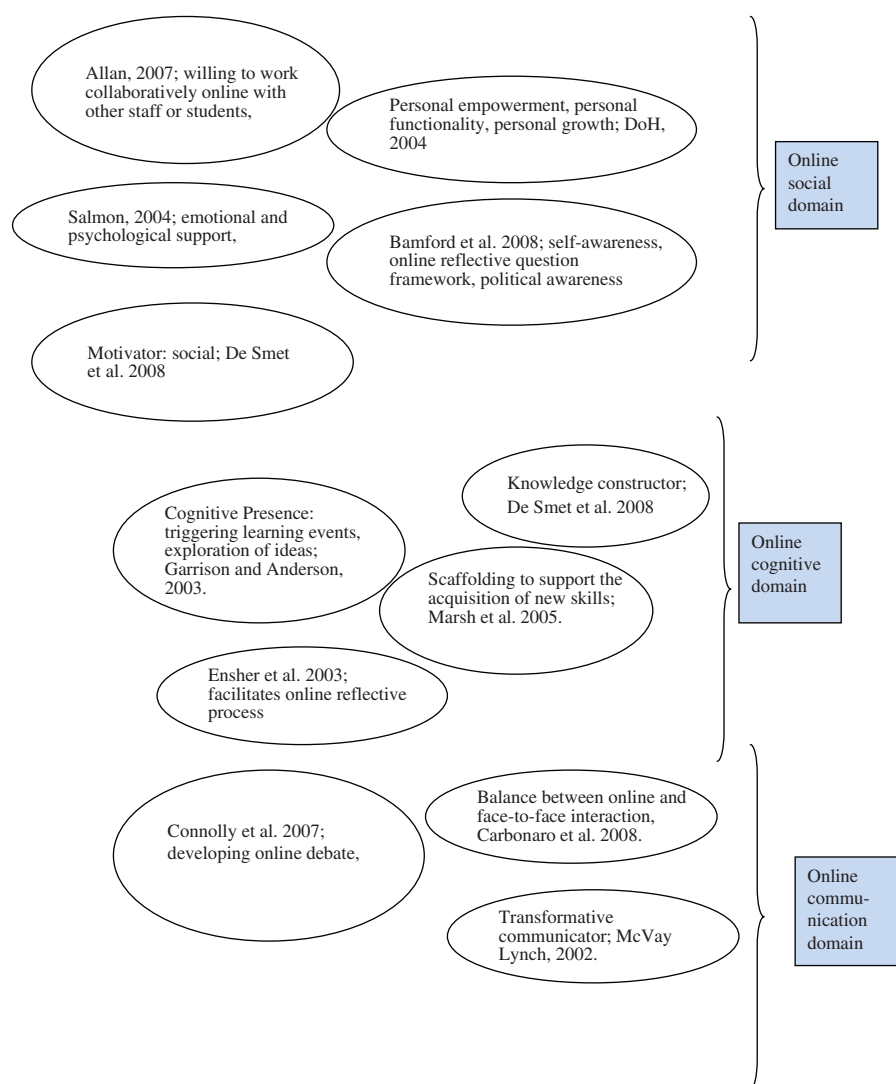

Figure 4. Example of unsorted findings.

Figure 5. Example of findings sorted into themes for 2nd stagecoding.