

Understanding the Mentoring Environment Through Thematic Analysis of the Learning Environment in Medical Education: a Systematic Review



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BACKGROUND: Mentoring's success has been attributed to individualised matching, holistic mentoring relationships (MRs) and personalised mentoring environments (MEs). Whilst there is growing data on matching and MRs, a dearth of ME data has hindered development of mentoring programme. Inspired by studies likening MEs to learning environments (LEs) and data highlighting common characteristics between the two, this systematic review scrutinises reports on LEs to extrapolate the findings to the ME context to provide a better understanding of ME and their role in the mentoring process.

METHODS: Using identical search strategies, 6 reviewers carried out independent literature reviews of LEs in clinical medicine published between 1 January 2000 and 31 December 2015 using PubMed, ERIC, Cochrane Database of Systematic Reviews, Google Scholar and Scopus databases. Braun and Clarke's (2006) approach to thematic analysis was adopted to circumnavigate LE's evolving, context-specific, goal-sensitive, learner-tutor relationally dependent nature.

RESULTS: A total of 4574 abstracts were identified, 90 articles were reviewed, and 58 full-text articles were thematically analysed. The two themes identified were LE structure and LE culture. LE structure regards the framework that guides interactions within the LE. LE culture concerns the values and practices influencing learner-tutor-host organisation interactions.

DISCUSSION: LE is the product of culture and structure that influence and are influenced by the tutor-learner-host organisation relationship. LE structure guides the evolving tutor-learner-host organisation relationship whilst the LE culture nurtures it and oversees the LE structure. Similarities between LEs and MEs allow LE data to inform programme designers of ME's role in mentoring's success.

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INTRODUCTION

Mentoring shapes professional identities, moulds “values and beliefs” and nurtures professional and personal development through the provision of personalised, appropriate, specific and timely support.^{1, 2} Providing such individualised and holistic support depends upon an effective matching process, a nurturing mentoring relationship and a personalised mentoring environment.^{3–9} The matching process involves pairing mentors with like-minded mentees with similar goals, values, beliefs and complementary characteristics to initiate personalised ties that will form the basis for effective mentoring relationships (MRs).^{2, 3, 10} Successful MRs underpin mentoring's success^{3–9} and pivot upon the quality of the ties between mentee, mentor and the host organisation. Nurturing enduring MRs that flourish in changing mentoring conditions require the presence of mentoring environments (MEs).^{5, 7–9, 11, 12}

However, unlike matching and MRs which are increasingly the focus of medical education research,^{5–9, 13–17} MEs remain poorly studied.^{3–9, 12, 18, 19} Whilst envisaged as an “emotionally safe”, supportive and “protégé-centred” setting that facilitates the formation of personalised MRs,^{5, 7–9} a formal definition of MEs continues to elude mentoring practice.^{1–4, 11, 12, 14, 18, 20–28} This lacuna has hindered development of effective mentoring programmes within medical training.^{5, 7–9} Inspired by studies that liken MEs to learning environments (LEs) and data highlighting common characteristics within MEs and LEs, this systematic review scrutinises LEs to better understand MEs and guide design and oversight of mentoring programmes.^{3, 4, 18, 27, 29–32}

Mentoring Environment

Davis and Nakamura (2010, p. 1060) characterise ME as a “function of a relationship that rests upon a set of interactional foundations that allow a protégé to capitalize on the strengths of the mentor, and it facilitates behaviors that will enable the protégé to develop and internalize the requisite knowledge, skills, and attitudes (KSAs) as fully as possible”.²⁰ Sng et al.’s (2017) delineation of the influential role of the mentor and host organisation within the mentoring relationships^{3, 12} and Tan et al.’s (2018) description of mentoring’s evolving, entwined, goal-specific, context-sensitive, mentor-, mentee-, relational- and organisational-dependent nature (henceforth mentoring’s nature),^{3, 4, 12, 18, 27} which are not featured in Davis and Nakamura’s (2010) definition, have cast doubts about its applicability in modern mentoring practice.^{3, 4, 8, 18, 20} In addition, “over-reliance on cross-sectional designs and self-report data, a failure to differentiate between different forms of mentoring (e.g., formal versus informal), lack of dyadic data, and the use of psychometrically questionable measures”²⁸ at the heart of Davis and Nakamura’s (2010, p. 1060) definition raise further concerns about their characterisation of MEs.

In the absence of robust studies of MEs, Pololi (2002)²⁹ and Kalén, Ponzer and Silén (2012)³⁰ suggest that MEs may be understood through studies of learning environments (LEs).^{3, 4, 18, 27, 31, 32} Data that likens LEs and MEs to personalised educational environments^{31, 33} that are influenced by the prevailing healthcare and education systems and the professional and personal factors impacting the learner, the tutor and the host organisation add traction to efforts understand MEs through the study of LEs.^{3, 4, 8, 12, 18, 19}

Learning Environments

The World Federation for Medical Education (1998, p. 553)³² lists LEs as one of the targets for “the evaluation of medical education programmes” and the UK Standing Committee on Postgraduate Education (1991)³⁴ stated that LEs were pivotal to “a working environment that is conducive to learning”.

Prevailing data suggest that LEs are shaped by four considerations: one, the setting, context and the goals of the learning process;^{31, 33, 35} two, the character, abilities, needs and motivations of the learner and the tutor;^{33, 36} three, the influence and support of the host organisation which provides financial and administrative support to the tutors, learners and the programme itself;^{35, 37–42} four, the impact of external factors such as the social, cultural, healthcare and educational factors within the learning context.^{31, 35} These considerations suggest that LEs like MEs exhibit^{5, 7–9} context-specific, goal-sensitive, learner-, tutor-, host organisation- and relational-dependent characteristics (henceforth LE’s nature). Similarities in the nature and roles of LEs and MEs suggest that data accrued from studies of LEs may be applied to MEs.^{29, 30}

METHODOLOGY

A systematic review of LEs in undergraduate and postgraduate medical schools was conducted in accordance with the PRISMA guidelines.⁴³ In the absence of an a priori framework for LEs and MEs, growing suggestions that LEs like MEs are “social phenomena” and LE’s nature which restrict studies of LE to comparable learning approaches and settings, a qualitative approach to analysis was adopted.^{3, 4, 18, 27, 38, 40–42, 44, 45} Braun and Clarke’s (2006) approach to thematic analysis was selected given its use in recent mentoring reviews.^{5, 7–9} Use of Braun and Clarke’s (2006) approach to thematic analysis was also supported by the presence of a wide range of research methodologies amongst the papers reviewed that makes statistical pooling and analysis difficult.^{3, 4, 18, 27, 38, 40–42, 44, 45}

Six authors experienced in the use of Braun and Clarke’s (2006) approach to thematic analysis carried out independent analyses of the same 10 included articles. Codes were constructed from the “surface” meaning of the data with line-by-line coding, proceeding to focused coding, and semantic themes were then identified from the categorisation of these “detail rich” codes. The 10 coded scripts were discussed, and a common coding framework and codebook were agreed upon using the “negotiated consensual validation” approach.¹ The six authors (HJM, YHW, OZX, SQ, TYP, LK) carried out independent thematic analyses of the remaining articles based on the codebook with new codes discussed online and face-to-face at authors’ meetings.

The narrative produced was guided by the Best Evidence Medical Education (BEME) Collaboration guide⁴⁶ and the STORIES (Structured approach to the Reporting In healthcare education of Evidence Synthesis) statement.⁴⁷

Literature Search

The inclusion and exclusion criteria for this review were in accordance with PICOS strategy. The review was designed by the six authors, two librarians and three clinicians and medical education experts. Studies were confined to accounts of mentoring programmes published after 2000, given the tendency of articles published prior to 2000 to conflate mentoring with supervision, coaching, role modelling and tutoring.^{3, 5, 7–9} Only articles published in English or had English translations published between 2000 and 2015 were included.

PICOS STRATEGY

Participants

Studies were confined to undergraduate and postgraduate medical school programmes in the clinical discipline of general medicine in acknowledgement of LE’s nature that prevents comparisons of LEs across heterogeneous educational goals, processes and settings evident in different clinical specialities. Non-medical fields such as midwifery, nursing, psychology, military medicine, complementary medicine,

paediatrics, obstetrics and gynaecology, service quality, quality improvement, medical simulation, chiropractice, athletic/sports medicine, surgery and urology were excluded.

Interventions

Studies examining the “learning environment”, “educational environment” or “clinical teaching environment” were included. Studies involving outcome measures, e.g. assessment of the educational environment through validated tools, e.g. DREEM, PHEEM and ACLEEM, were also included.

Outcome

Articles that studied outcomes of learning environments were selected.

Study Design. Mentoring literature is heterogeneous. As a result, literature reviews, observational studies (both qualitative and quantitative) and interventional studies were included given that the settings and study populations are clear. Perspective pieces, personal accounts, reflections, opinions, commentaries and editorials were excluded to focus this review upon specific practices in acknowledgement of LE’s nature.

Search Strategy

Guided by two librarians, local education experts and clinicians, the six authors (HJM, YHW, OZX, SQ, TYP, LK) designed and carried out independent searches based on agreed upon inclusion and exclusion criteria (refer to Table 1). Using the MeSH terms “Clinical medicine”, “Clinical teaching environment” and “Education environment” in the PubMed, ERIC, Cochrane Database of

Systematic Reviews, Google Scholar and Scopus databases, the six authors reviewed articles published in English or had English translations between 1 January 2000 and 31 December 2015. General terms were used to better capture a wide spectrum of accounts of LEs. The searches were carried out between 12 January 2018 and 20 January 2018. The six authors screened the titles and abstracts independently to identify relevant studies meeting the pre-specified inclusion criteria. The authors discussed and agreed upon the list of full-text articles to be reviewed using Sambunjak et al.’s (2009, p. 73)¹ “negotiated consensual validation”. The authors then screened the list of full text independently and employed Sambunjak et al.’s (2009, p. 73)¹ “negotiated consensual validation” to achieve consensus upon the final list of articles to be included in the study at a face-to-face meeting.

Quality Assessment of Studies

Two authors (HJM, YHW) carried out individual appraisals of quantitative studies using the Medical Education Research Study Quality Instrument (MERSQI) and the Consolidated Criteria for Reporting Qualitative Studies (COREQ) to evaluate the quality and qualitative studies included in this review (refer to Appendix 1 online). The six-person study team met face-to-face to reconcile any differences in their assessments and to forward a consensus-based appraisal of the included studies.

Risk of Bias

The included studies tended to focus upon positive aspects of LEs leaving the negative accounts of LEs under-represented in the literature.

Table 1 Number of Hits Obtained in PubMed Database

Recent queries in PubMed		
Search	Query	Items found
#1	Search (((“clinical medicine”[MeSH Terms] OR (“clinical”[All Fields] AND “medicine”[All Fields]) OR “clinical medicine”[All Fields]))) Sort by: Best Match Filters: Publication date from 2000/01/01 to 2015/12/31; English	689,190
#2	Search (((“education”[Subheading] OR “education”[All Fields] OR “educational status”[MeSH Terms] OR (“educational”[All Fields] AND “status”[All Fields]) OR “educational status”[All Fields] OR “education”[All Fields] OR “education”[MeSH Terms]))) Sort by: Best Match Filters: Publication date from 2000/01/01 to 2015/12/31; English	603,909
#3	Search (((((“environment”[MeSH Terms] OR “environment”[All Fields])) OR (clinical[All Fields] AND (“education”[Subheading] OR “education”[All Fields] OR “teaching”[All Fields] OR “teaching”[MeSH Terms]) AND (“environment”[MeSH Terms] OR “environment”[All Fields] OR (“environment”[All Fields] AND “environment”[All Fields]) OR “environment environment”[All Fields]))) AND (((“education”[Subheading] OR “education”[All Fields] OR “educational status”[MeSH Terms] OR (“educational”[All Fields] AND “status”[All Fields]) OR “educational status”[All Fields] OR “education”[All Fields] OR “education”[MeSH Terms]))) AND (((“clinical medicine”[MeSH Terms] OR (“clinical”[All Fields] AND “medicine”[All Fields]) OR “clinical medicine”[All Fields]))) Sort by: Best Match Filters: Publication date from 2000/01/01 to 2015/12/31; English	3365
#4	Search (((((“clinical medicine”[MeSH Terms] OR (“clinical”[All Fields] AND “medicine”[All Fields]) OR “clinical medicine”[All Fields]))) AND (((“education”[Subheading] OR “education”[All Fields] OR “educational status”[MeSH Terms] OR (“educational”[All Fields] AND “status”[All Fields]) OR “educational status”[All Fields] OR “education”[All Fields] OR “education”[MeSH Terms]))) AND (((“environment”[MeSH Terms] OR “environment”[All Fields]) OR (clinical[All Fields] AND (“education”[Subheading] OR “education”[All Fields] OR “teaching”[All Fields] OR “teaching”[MeSH Terms]) AND (“environment”[MeSH Terms] OR “environment”[All Fields] OR (“environment”[All Fields] AND “environment”[All Fields]) OR “environment environment”[All Fields]))) Sort by: Best Match Filters: Publication date from 2000/01/01 to 2015/12/31; English	3750

RESULTS

Using Sambunjak et al.'s (2009, p. 73)¹ “negotiated consensual validation”, the six reviewers identified 4574 abstracts, reviewed 90 full-text articles and included 58 articles^{36, 48–104} in this review (Fig. 1). A summary table of the selected articles are included in Appendix 1 online.

The two themes identified were LE structure and LE culture. The structure of LEs (LE structure) concerns the framework and infrastructure that facilitates interactions within the LE. The culture within LEs (LE culture) relates to the norms, values, beliefs, practices and support moulding the socioemotional environment in which learning occurs and that influence interactions between the learner, tutor and organisation.¹⁰⁵ The term “tutor” encapsulates the terms teacher, tutor, mentor and/or supervisor featured in the included articles.

LE Structure

The LE structure refers to the framework that shapes the learning approach and ensures consistent professional and personal support for learners and tutors within the programme. The LE structure is made up of five sub-themes that include the formal curriculum, the host organisation, the tutor, the learner and the learning relationship (relationship between learner and tutor). The formal curriculum is defined as “the actual course of study, the planned content, teaching, evaluation methods, syllabi, and other materials used in any educational setting from lecture halls to labs to seminar rooms. Also included are formal policy statements, regulations, expectations, and competencies for every educational cohort conceivable”.¹⁰⁶

Formal Curriculum. Seventeen articles^{36, 53, 56, 58, 65, 68, 78, 82, 87, 90–93, 99, 102, 104, 107} discussed the role of the formal curriculum in the LE structure. The formal curriculum maps out the goals, learning objectives, assessment methods and the educational approach employed.^{58, 65, 87, 104} It also specifies the roles and responsibilities of the tutor and learner, the codes of conduct and standards of practice that will be employed.^{56, 99, 102, 107} The formal curriculum stipulates the frequency, duration and timings of meetings, online interactions, tutorials, teaching sessions and feedback sessions^{53, 68, 87} and the provision of “protected” time for learners and tutors.^{53, 90, 91} The formal curriculum is thus responsible for structuring the learning process and formal interactions within the LE.^{36, 56, 78, 82, 91–93, 99, 107}

Design and content of the formal curriculum is influenced by the host organisation and external factors such as the healthcare and education systems as well as the setting, funding, support and sustainability of the programme, highlighting a reciprocal relationship between the LE structure and the formal curriculum.^{36, 56, 78, 82, 91–93, 99, 107}

Host Organisation. A reciprocal relationship is between the host organisation and the LE structure that is also evident in the 12 papers discussing the role of the host organisation.^{51, 53,}

^{62, 68, 77, 79, 80, 85, 86, 90, 91, 102, 104} The host organisation is responsible for supporting and overseeing activities stipulated within the curriculum. The host organisation has direct and indirect influence upon the LE structure.^{51, 53, 62, 68, 77, 79, 80, 85, 86, 90, 91, 102, 104}

Direct influence of the host organisation upon the LE structure is primarily through the matching process and mentee and mentor training.^{49, 56, 86, 88, 99, 102, 107} The host organisation also directly defines and oversees compliance of the roles, responsibilities and code of conduct of tutors and learners.^{53, 56, 99, 102, 107}

Indirect support of the LE structure is evident through the financial and administrative support provided to the programme, learners and tutors by the host organisation.^{53, 85, 90, 91, 102, 104} Administrative support influences the planning and scheduling of rotations, guides supervisory support of learners and tutors^{49, 85, 88} and regulates the learning relationship.^{51, 68, 79, 80, 85, 104}

The host organisation is itself influenced by departmental policies and broader curricular considerations.^{68, 77, 86} Regnant education and healthcare systems which set system-wide standards of practice and codes of conduct employed in the curriculum also influence the host organisation and the roles it plays.^{77, 86} The available support and capacity of the host organisation then impact the content and design of the formal curriculum.

Tutor. Nine papers discussed the reciprocal relationship between tutors and the LE structure.^{36, 51, 58, 61, 65, 66, 69, 84, 85, 99} The tutor’s abilities and skills in maintaining⁸⁵ and monitoring^{66, 84, 85, 99} a structured learner-centred approach and in providing appropriate and timely feedback^{58, 61, 65} and support^{36, 85} influence the LE structure. The tutor’s abilities and skills also impact oversight of the learning relationship.^{36, 51, 58} Hudson (2004) and Mann (2001) believe that the tutor also affects the LE structure when adapting their educational approaches to meet the learner’s needs.^{69, 85}

The LE structure influences tutors through the selection, training and matching process it adopts, underlining a reciprocal relationship between LE structure and tutors.^{36, 51, 58, 61, 65, 66, 69, 84, 85, 99}

Learner. The learner also influences and is influenced by the LE structure.^{66, 85, 93, 103} Through the selection, training and matching process, the LE structure determines admission to the learning programme. The learner’s skills, knowledge,^{85, 93} personal circumstances (e.g. stressors in their private life, relationships with peers⁶⁶), beliefs, motivations and “open mindedness”⁸⁵ influence interactions between learner and the tutor and organisation¹⁰³ and impacts the efficacy of the learning process.^{66, 85, 93, 103}

Learning Relationship. Fourteen articles^{19, 71, 82, 83, 85, 90, 100, 108–114} discussed the learning relationship between tutor and learner. The LE structure impacts the learning relationship

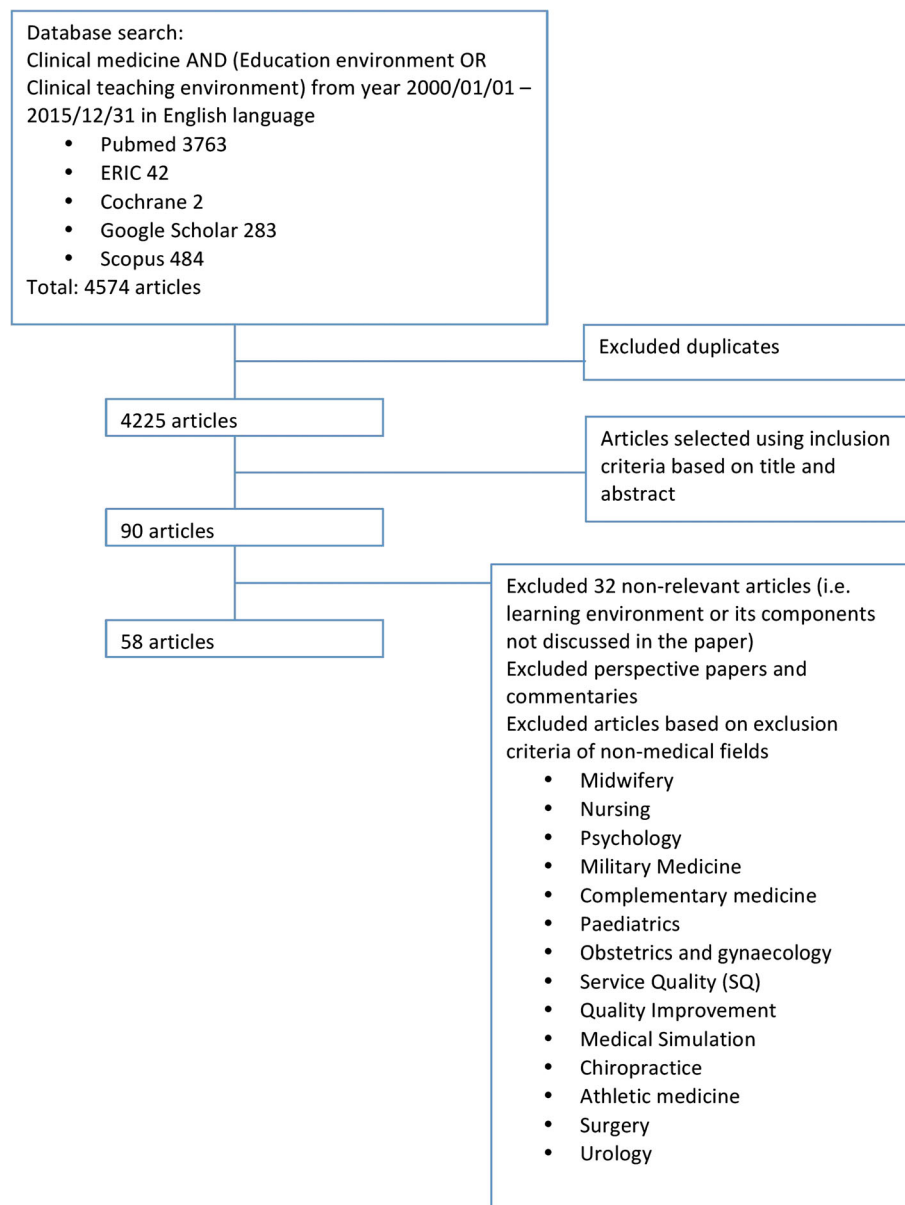


Figure 1 PRISMA chart.

through matching processes adopted, specifically by influencing the “goodness of fit” between learners and tutors or how well learners and tutors complement each other’s personalities, work ethic and the presence of shared interests and goals.^{19, 108–114} The LE structure also determines the form, content and frequency of interactions^{71, 90, 100} which impact the development of the learning relationship.^{71, 90, 100}

Karani (2014) reveals that the learning relationship and the LE structure share a co-dependent relationship. Gan et al. (2014) expand upon this premise by suggesting that the relationship between the tutor and the learner and the LE structure are also affected by external factors and curricular influences. Adaptations to support the learning relationship affect the LE structure.^{66, 71} Gan et al. (2014) report that long hours, sleep deprivation and the need to adapt to changing environments impact learning relationships and thus the LE structure.

Culture

LE culture refers to the norms, values, beliefs, practices and support moulding the socioemotional environment in which learning occurs.¹⁰⁵ There are five sub-themes to culture that include the informal and hidden curriculum, the host organisation, the tutor, the learner and the learning relationship (relationship between learner and tutor). The informal curriculum denotes “much of what occurs in clinical settings—the opportunistic, idiosyncratic, pop-up, and often unplanned instruction that takes place between anyone who is teaching (attendings, residents, other health care professionals) and trainees. The informal curriculum also takes place in nonclinical settings such as faculty offices, hallway interactions, or the countless other settings in which teachers and other health care providers interact with trainees”.¹⁰⁶ The hidden curriculum “includes the ideological and subliminal messages of both the

formal and informal curricula. The hidden curriculum can be both human and structural; that is, it can be transmitted through human behaviours and through the structures and practices of institutions”¹⁰⁶.

Informal and Hidden Curriculum. The hidden and informal curriculum affects learning⁸⁸ and collaboration.³⁶ The hidden and informal curriculum is shaped by the institution, tutors and learners and impacts learning through observation, reflection,⁷¹ and role modelling.⁷⁹ Karani (2014) noted that residents employed “unwritten rules” and practices of the hospital environment to guide undergraduate learners navigating and adapting to the clinical environment.

Host Organisation. The host organisation directly and indirectly influences the LE culture.^{25, 53, 69, 71, 87, 99} Ramani (2008) noted that the host organisation directly influences LE culture by “demystifying” the hidden curriculum. This may include specifying promotion criteria and clarifying the nature of academic tracks adopted by the programme.²⁵ Indirect influences of the host organisation upon LE culture are apparent in the institutional vision, values and goals of its programmes and in the policies it adopts.

Tutor. Thirteen papers discussed the tutor’s influence upon LE culture.^{36, 51, 52, 58, 61, 65, 66, 71, 79, 83–85, 99} The tutor’s skills at role modelling⁷¹ approachability, empathy, patience, collaboration, warmth, enthusiasm, respectfulness, commitment to teaching and the various aspects of professionalism inform practice and shape interactions with the learner.^{36, 52, 66, 79, 80, 83, 85, 99} Gan et al. (2014) reported that learners felt that informal “lessons” heavily influence students’ emotions and behaviour.

Learner. The learner’s skills, knowledge,^{85, 93} personal circumstances (e.g. stressors in their private life,

relationships with peers⁶⁶), beliefs, motivations and “open mindedness”⁸⁵ also influence the learner’s interactions with the tutor and organisation.¹⁰³ A positive or negative personal and/or socioemotional climate alters the learner’s perception of the learning environment.⁶⁶

Learning Relationship. A collaborative^{71, 90, 100} culture characterised by mutual commitment, authenticity, cooperation, honesty and flexibility and respect nurtures the learning relationship, creates personalised ties^{64, 71, 85, 100} and prevents isolation of learners.^{66, 94, 101} Chinthammitr and Chierakul (2014) showed how good teacher-student relationships in Thai educational culture contributes to a positive learning environment.⁵⁷ Young (2014) reported that a safe learning relationship allowed learners to test their limits and develop their professional identity whilst Mann (2001) noted that appreciation of the learning relationship motivated tutors.^{85, 103}

DISCUSSION

This study dispenses with the notion of a dyadic relationship between the learner and tutor at the centre of the learning process and substitutes it with an entwined concept of the LE that involves the host organisation, the learner, the tutor, the relationships they share and the wider healthcare and educational systems (henceforth elements). Each element is interdependent and brings with it, its own goals, timelines, practices, code of conduct and expectations that creates a structure to the learning process referred to as the LE structure. Each element also brings with it individual norms, values and beliefs that come together to inform and influence interactions with one another creating the LE culture.¹⁰⁵ LE structure maps out the learning process but is sufficiently flexible to contend

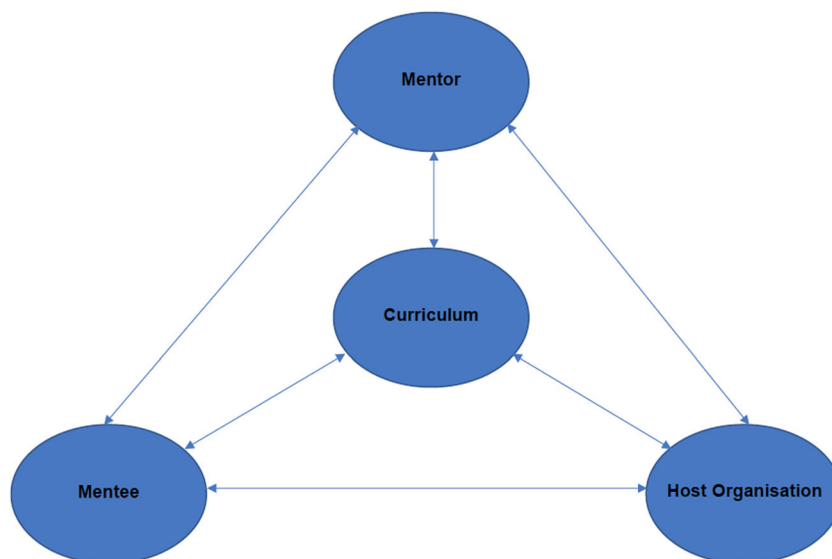


Figure 2 Interactions between the quartet of stakeholders.

with the evolving needs of each element albeit within the confines of acceptable practice standards and guidelines. LE culture informs adaptations to the LE structure ensuring its personalization. The influence and co-dependence of elements within the LE culture and the LE structure underline the entwined, evolving, adapting, context-specific, goal-sensitive, learner-, tutor-, relationship- and host organisation-dependent nature of the LE (henceforth LE's nature). Concurrently, the presence of adaptations to the LE hints at the role of assessments of the learner's progress, abilities and needs by the tutor and evaluations of the progress of the programme by the host organisation. Assessments and evaluations within the mentoring process are neglected in prevailing data.³⁻⁹

A Definition of LE

New insights and data from this study suggest that LE may be defined as "the product of the culture and structure shaped by evolving interactions between the tutor, the learner, the host organization and the formal, informal and hidden curriculum (henceforth quartet of stakeholders). The structural element of the LE influences the quality of learning, supports the personal and professional development of the learner and the tutor and ensures that learning interactions remain within the confined accepted codes of conduct and professional standards of practice. Cultural considerations help personalize the LE and meet the unique and evolving needs of the quartet of stakeholders. These factors highlight LE's evolving, goal-sensitive, context-specific, learner-, tutor-, relational-, organization-dependent nature (LE's nature). It forms part of the holistic evaluations to be considered when balancing the sometimes-competing demands for consistency and flexibility in the LE".

Linking LEs and Mentoring Environments

Commonalities in LE's and ME's overall goals and processes as well as their evolving, goal-sensitive, context-specific, mentee-, mentor- relational-, organisation-dependent nature support Pololi's (2002) and Kalén, Ponzer and Silén's (2012) posits that extrapolation of LE data to the ME setting is possible.^{3, 7, 29, 30}

In extrapolating LE data, MEs can be defined as "shaped by the nature, culture and structure of evolving mentoring relationships between the mentor, the mentee, the host organisation and the curriculum (henceforth quartet of stakeholders) (Fig. 2). MEs evolve to support and nurture mentoring relationships in dynamic conditions and as particular relationships amongst the quartet of stakeholders change. MEs influence the quality of education and professional practice."

Limitations

Whilst the themes identified in this review echo the key elements within prevailing tools to study learning environments such as the Dundee Ready Education Environment Measure (DREEM)^{39, 115} and the Postgraduate Hospital

Educational Environment Measure (PHEEM),¹¹⁶ the data comes from a small pool of articles published in English or with English translations. The presence of mainly North American and European accounts of LEs skews perspectives and raises questions as to the applicability of these findings in other healthcare settings given the importance of norms, values, beliefs and practices upon LEs.

Although there is overlap between ME and LE, and lessons gleaned from LE may inform the development of a conducive ME, they require contextualisation to the local setting. Furthermore, many of the conclusions drawn remain rooted in "Cartesian reductionism and Newtonian principles of linearity"¹¹⁷ which ignore the evolving and adaptive nature of LEs and MEs compromising the applicability of LE findings to MEs.

CONCLUSION

New insights into MEs provided here underline the need to contextualise, personalise and adapt mentoring programmes to local practice and individual mentees. Critical to this process is the need for effective assessment methods that move beyond "Cartesian reductionism and Newtonian principles of linearity"¹¹⁷ and can contend with ME's evolving nature. These evaluation tools must be robust, adaptable, holistic and longitudinal to account for the hitherto unrecognised influence of the host organisation, curriculum, healthcare and education systems. In addition, assessment methods are required to evaluate mentee progress, needs and abilities to better inform adaptations to the ME approach.

There is much to be understood of the mentoring process, not least in light of suggestions that the role and influence of each stakeholder is intertwined and requires careful scrutiny. We hope that our concept of ME expands upon prevailing ideas to better guide design and oversight of mentoring programmes and highlight the critical areas for much needed future research.

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Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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